AMERICAN METEOROLOGICAL SOCIETY

Illinois U Library
QC
916 S515
A512m

meteorological

abstracts and bibliography

Sponsored by
AIR FORCE CAMBRIDGE RESEARCH CENTER

Bibliography on Auroras

4 October, 1953 No. 10

METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

Editor and Technical Supervisor: MALCOLM RIGBY

Corresponding Editor: DR. C. E. P. BROOKS

EDITORIAL STAFF

ANDREW ASSUR, *Analyst*
ISADORE L. DORDICK, *Analyst*
DOROTHY M. GROPP, *Cataloguer*
MOLLIE P. KRAMER, *Bibliographer*
KATHERINE MARTINOFF, *Technical Editor*
WILHELM NUPEN, *Analyst*
MARY L. RICE, *Assistant Editor-Bibliographer*
WINIFRED SCHRAITLE, *Cataloguer*
GEZA THURONYI, *Bibliographer*
MARIA WLATSCHUGA, *Assistant Technical Editor*
NIKOLAY T. ZIKEEV, *Bibliographer*

*EDITORIAL OFFICE: Washington, D. C. P.O. ADDRESS: Box 1736, Washington 13, D. C. Telephone: REpublic 7-6278.

ADMINISTRATIVE OFFICE: American Meteorological Society, Office of Executive Secretary, 3 Joy Street, Boston 8, Mass.

* Address all business communications, orders and inquiries to the Executive Secretary, Mr. Kenneth C. Spengler, 3 Joy Street, Boston 8, Mass. Exchanges and reprints may be sent direct to P. O. Box 1736, Washington 13, D. C.

METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY is a monthly publication devoted to:

A. Current Abstracts in English on important meteorological literature in every language.

B. Bibliographic references to other items of interest to the profession.

C. Selective, annotated bibliographies on subjects of immediate and special interest to meteorologists.

SUBSCRIPTION RATE: $9.00 per year to members and non members. Single and back issues $2.00. Back volumes, $10 per volume.

This publication has been made possible through support and sponsorship extended by the Geophysics Research Directorate of the Air Force Cambridge Research Center, Air Research and Development Command under Contract No. A. F. 19 (604)-302.

METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

Vol. 4 OCTOBER, 1953 No. 10

AGRICULTURE · COMMERCE · AERIAL AND MARINE NAVIGATION · PUBLIC HEALTH · INDUSTRY · ENGINEERING
AMERICAN METEOROLOGICAL SOCIETY
1919

SPECIAL FEATURE IN THIS ISSUE

A Selective Annotated Bibliography on Auroras

(*For complete table of contents see back cover*)

Published monthly at Prince and Lemon Streets, Lancaster, Pa., by the AMERICAN METEOROLOGICAL SOCIETY, 3 Joy Street, Boston 8, Mass.

Printed and issued by: Lancaster Press, Inc.

FOREWORD

Meteorological Abstracts and Bibliography is a monthly publication whose purpose is to ring to the attention of meteorologists current literature in their field and in related fields and o provide bibliographic information on various subjects, as interest demands.

Part I contains from 175 to 300 abstracts of current periodical literature and monographs in he fields of meteorology, hydrology, oceanography, etc. These abstracts are arranged ccording to the Universal Decimal Classification.

Part II of each issue comprises a special annotated bibliography of from 50 to 250 im- ortant references on a special subject without respect to recency of material. No attempt s made to prepare exhaustive bibliographies; instead, the aim is to include a representative ross section of the various aspects of a subject. Preference is given to recent material, omprehensive works, material from obscure sources, and items with good bibliographies.

Bibliographies previously published were:

No. Mo.	Vol. I, 1950	Vol. II, 1951	Vol. III, 1952
1. Jan.	**Atmospheric Pollution**	**Extended Forecasting**	**Climate—Northwest Africa**
2. Feb.	**Aerobiology**	**Long Range Forecasting**	**Carbon Dioxide**
3. March	**Cloud Physics**	**Soil Temperature**	**Climate—Argentina, etc.**
4. April	**Hail**	**Constants, Tables, etc.**	**Dew**
5. May	**Tornadoes**	**Climate—Near East**	**Objective Forecasting**
6. June	**Volcanic Dust**	**Climate—Middle East**	**Stratus Forecasting**
7. July	**Climatic Changes**	**Special Winds**	**Urban Climatology**
8. Aug.	**Thunderstorms**	**Radar Storm Detection**	**Climate—Central Africa**
9. Sept.	**Icing**	**Condensation Trails**	**Visibility**
0. Oct.	**Acoustical Propagation**	**Climate—Northeast Africa**	**Glaze and Rime**
1. Nov.	**Evaporation**	**Mountain Meteorology**	**Free Air Turbulence**

Bibliographies published this year are:

1. **Turbulence Theory,** Vol. IV, No. 1, Jan. 1953
2. **Turbulent Diffusion and Exchange,** Vol. IV, No. 2, Feb. 1953
3. **Frost and Frost Forecasting,** Vol. IV, No. 3, March 1953
4. **Climate of Australia and New Zealand,** Vol. IV, No. 4, April 1953
5. **High Level Winds (500–100 mb),** Vol. IV, No. 5, May 1953
6. **High Level Winds (above 100 mb),** Vol. IV, No. 6, June 1953
7. **Jet Stream,** Vol. IV, No. 7, July 1953
8. **Radiation Bioclimatology,** Vol. IV, No. 8, Aug. 1953
9. **Climatology and Marine Meteorology of the Pacific,** Vol. IV, No. 9, Sept. 1953
10. **Auroras,** Vol. IV, No. 10, Oct. 1953

Forthcoming bibliographies will be:

11. **Sferics,** Vol. IV, No. 11, Nov. 1953

Other bibliographies in preparation are:

Actinometers
Arctic Meteorology
Auroral Physics
Climate of Southeast Asia and the East Indies
Machine Methods in Meteorology
Microwave Propagation
Oceanographic Meteorology
Ozone
Radiation Data
Snow Cover
Tropical Cyclones
Tropopause Variations

Part III contains a listing of the contents of those journals which are primarily meteoro- ogical. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes. In the December issue umulative author, subject, geographical and journal indexes are published.

EXPLANATIONS

Location of material: For each entry, a symbol is given for at least one library where th material may be found. The Union List of Serials (Gregory) is the source of most of th symbols used. In some cases, where no symbol has been assigned to a library, one will b devised according to the principles of the Union List.

Library symbols used frequently may be found in the following list:

DA:	U. S. Dept. of Agriculture Library, Washington, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DGS:	U. S. Geological Survey Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DSG:	U. S. Army Medical Library, Washington, D. C.
DSI:	Smithsonian Institution Library, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.
GB-MO:	Great Britain, Meteorological Office Library, Harrow, England.
MH-BH:	Harvard University, Blue Hill Observatory (and American Meteorologic Society) Library, Milton, Mass.
NN:	New York Public Library, New York, N. Y.
NNA:	American Geographical Society Library, New York, N. Y.

Other symbols:

*	before an entry indicates a good data source.
†	before an entry indicates a good bibliography.
§	before an entry indicates a synoptic case history study accompanied by chart

Geographic locations are in the English form rather than the form used locally, for exampl Moscow for Moskva.

Titles of articles or monographs are in the language of the original article unless otherwis stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet according to th Library of Congress transliteration scheme.

Abbreviations:

Titles of periodicals are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months a abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Numbe (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus a entry will read as follows:

Meteorologische Rundschau, 2(5–6):146–151, May–June 1950.

This indicates that the article appeared in *Meteorologische Rundschau*, *Jahrgang* 2 (Vo 2), *Heft* 5–6 (No. 5 and 6), *pages* 146–151, May–June 1950.

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

WORKS OF SPECIAL INTEREST

4.10–1 551.571.7:551.521.3

Arakawa, Hidetoshi and Tsutsumi, K. (*Met. Research Inst., Japan*), **Mean precipitable water in Japan.** *Meteorological Society of Japan, Journal, 2nd Ser.*, 30(6):203–209, June 1952. 2 figs., tables, 8 refs. In Japanese, English summary p. 203. **DWB**—Data on precipitable water amounts between the surface and the 400 mb level are presented for 11 stations throughout Japan. The basic data were taken from "Aerological Data of Japan" published by the Central Met. Obs., Tokyo, and the standard formula $\Sigma 0.01\,\bar{q}\Delta p$ was used in computing them (Δp = pressure difference between the two levels; q = specific humidity computed by means of a slide rule devised by ARAKAWA). For purposes of comparison the annual variation of a theoretical value of depth of precipitable water is tabulated. Two station values in Japan are compared with two in the U. S. *Subject Headings:* **1. Precipitable water 2. Upper air humidity 3. Japan.**—*G.T.*

4.10–2 551.524.36(73/9)

Court, Arnold, **Temperature extremes in the United States.** *Geographical Review*, 43(1):39–49, Jan. **1953.** 3 figs., 7 refs. **DLC**—The author discusses the statistical theory of extreme values by means of which the most probable extreme values "likely in any given period of time, on the basis of all the extremes that have been observed," can be computed. This theory is applied to the highest and lowest air temperature of each year at 100 places in the U. S. and extremes expected to occur once in a 100 years are calculated. Highest and the lowest temperatures estimated on the basis of annual extremes recorded between 1901 and 1930 are shown on two maps and compared with the extreme temperatures recorded during the entire meteorological record of these and other places. *Subject Headings:* **1. Temperature extremes 2. United States.**—*I.L.D.*

4.10–3 523.7(02)

Dauvillier, Alexandre (*Prof. College de France*), **La physique cosmique.** [Cosmic physics.] Paris, Flammarion, **1951.** 246 p. graph, 2 tables, refs. Bibliothèque de Philosophie Scientifique, Paris. **DLC**—In this pocket-size edition there are ten chapters covering in a semitechnical style 1) the scope of and history of science of astrophysics, 2) the origin of the solar system, 3) the earth's physiography, 4) Quaternary glaciation, 5) magnetism of stars and planets, 6) geomagnetism, 7) cosmic rays, 8) origin of life, 9) evolution of species and 10) the social value of science. Chap. 4 gives a thorough but concise summary of our knowledge of Quaternary climates based on work of C. E. P. BROOKS (1949), R. F. FLINT (1947) and others. Magnetic storms are discussed and Chap. 7 gives a very lucid account of cosmic ray research, observatories and theories to 1950. The introductory chapter presents information on astrophysical observatories all over the world. *Subject Headings:* **1. Astrophysics 2. Cosmic radiation 3. Textbooks.**—*M.R.*

4.10–4 551.582.2(612.3)

†*Fàntoli, Amilcare, **Le pioggie della Libia, con particolare reguardo alle zone di avvalonamento.** [Rainfall in Libya, with special emphasis on the arable zone.] Rome, Ministero dell'Africa Italiana, Ispettorato Meteorologico, **1952.** 528 p. photos, diagrs., tables, refs. Meteorological bibliography on Libya and adjacent regions, p. 513–521; Precipitation data on Libyan stations, p. 327–509. Long review in Italian in: *Revista di Meteorologia Aeronautica*, 12(3):38–39, **1952.** **DWB**—A magnificent climatological study, consisting of 180 pages of

detailed tables (by regions and stations), >300 pages of descriptive and analytical materia (including many charts, photos, tables and graphs) and 9 pages of bibliography (arranged by country). The text consists of: history of observations, meteorological service and studies on the rainfall of North Africa (from 1819 to date), climatic zones of Tripolitania, Cirenaica and Libya (maritime, steppe, plateau and desert), network of stations, rain producing factors synoptic influences, comparison with other Mediterranean stations and, finally, an elaborate analysis of every conceivable statistical relation which can be obtained from long period records for the major stations (frequency of intensity, duration, etc. of individual storms or of periods for a month or a year, etc.). Areal distribution and regional peculiarities are also treated in detail. *Subject Headings:* **1. Precipitation data 2. Climate of Libya 3. Long period records 4. Bibliographies 5. Libya 6. North Africa.**—*M.R.*

4.10–5 551.509.33

*Germany. Deutscher Wetterdienst, **Die Grosswetterlagen Mitteleuropas.** [Large scale weather situation of Middle Europe.] Monthly. v. 1, **1948.** v. 6, No. 2, Feb. **1953.** 16 p. tables, charts. Price per year, DM 12,—. Previously issued by: Germany. Deutscher Wetterdienst in der US-Zone. **DWB**—One of the most important current contributions to long range forecasting, containing not only data, but also notes and short signed papers on new approaches to forecasting, results of statistical analysis of long period observations, mean maps for the troposphere, etc. The periodical is edited by HOFMANN, HESS and other former members of BAUR's Institute of Long Range Forecasting. Routine features: catalog of air masses for five German cities, daily precipitation and temperature deviations for South Germany, sunspot numbers, maps of precipitation and temperature anomalies for North America and Europe, monthly maps of surface pressure, absolute 500 mb and relative 500/1000 mb topography with deviations from normal for a large part of the Northern Hemisphere, 500 mb topography (Europe) and mean surface weather data (Germany) for each large scale weather situation, monthly "Climat" values for Germany, description of last month's weather processes and a forecast for weather and river flow for the next month. *Subject Headings:* **1. Long range forecasting 2. Meteorological data 3. Grosswetter 4. Northern Hemisphere 5. Germany. I. Hofmann, Alfred.**—*A.A.*

4.10–6 551.594:550.37:550.38

International Union of Geodesy and Geophysics. Association of Terrestrial Magnetism and Electricity, **Transactions of Oslo meeting, Aug. 19–28, 1949.** Ed. by J. W. Joyce. Washington, **1950.** 568 p. diagrs., graphs, tables, eqs., bibliog. Price: $3.50. *International Union of Geodesy and Geophysics. Association of Terrestrial Magnetism and Electricity Bulletin* 13. **DWB**—The agenda of the Oslo meeting, participants at the sessions, addresses of all members by countries, minutes of each session, a list of geomagneticians who died since 1939, statutes of the association, separate reports on work during the period 1939–1948 from Argentina, Australia, Belgium, British East Africa, Canada, China, Denmark, Finland, France, Germany, Great Britain, Hungary, India, Italy, Japan, Morocco, Norway, Peru, Poland, Sweden, Switzerland, Turkey, Union of South Africa and the U.S.A., including reports from separate institutions in many of these countries as well as of the official governmental institutions. Special reports of the Auroral Committee (CARL STÖRMER) and of members in eight countries, and of many other committees are included. Scientific papers by dozens of authors on solar activity, the ionosphere, terrestrial magnetism, the aurora, physics of the upper atmosphere and ionosphere, and atmospheric electricity make this a valuable compendium. *Subject Headings:* **1. Electrical phenomena 2. Terrestrial magnetism 3. Geophysics. I. Joyce, James Wallace** (*ed.*).—*M.R.*

4.10–7 551.521.33

Kuz'min, P. P., **O priblizhennom vychislenii effektivnogo izlucheniia poverkhnosti sushi moria.** [On the approximate calculation of effective radiation of the surface of the continents and oceans.] *U.S.S.R. Glavnoe Upravlenie Gidrometeorologicheskoĭ Sluzhby, Informatisionnyĭ Sbornik*, Leningrad, 1:83–87, **1951.** 4 tables, 6 refs., 12 eqs. Also: Kondrat'ev K. IA., **K voprosu o priblizhennom vychislenii effektivnogo izlucheniia zemnoĭ poverkhnosti** [On the approximate calculation of effective radiation of the earth's surface.] *Ibid.*, p. 88–90

refs., 3 eqs. **DLC**—A critical examination of methods for calculating the effective outgoing diation from a natural surface. The shortcomings of the application for calculation of rmulas of Ångström type are indicated. The author offers his own modified formula: $=d\sigma T_n^4-d\sigma T_a^4$. T_n and T_a=absolute temperature, d=extinction coefficient, σ=Steffan oltzman coefficient. This formula is based on both physical considerations and empirical lationships. Comparison of correction coefficients for various groups of cloudiness is resented. KONDRAT'EV cites incorrect statements made by KUZ'MIN. The principle efect of semiempirical schemes is their incompatibility with well-known theoretical conusions. *Subject Headings:* **1. Outgoing radiation. I. Kondrat'ev, K. IA.**—*N.T.Z.*

4.10–8 551.510.534 551.593.652

†§Langlo, Kaare, **On the amount of atmospheric ozone and its relation to meteorological onditions.** *Geofysiske Publikasjoner*, Oslo, 18(6), **1952.** 42 p. 12 tables, 14 figs., refs., eqs. **WB**—Various papers that have appeared since 1938 on the relation between atmospheric zone and meteorological conditions are reviewed. The available observational data on tmospheric ozone values are summarized and given in tables. The optical method of measurg the total amount of atmospheric ozone is described and sources of error discussed. The auses of observed variations from year to year in the annual mean amount of ozone are ttributed to variations of meteorological conditions in the ozone incline region and its variaons with latitude are analyzed and the various theories explaining it reviewed. The annual eriod in the amount of ozone is determined by meteorological conditions. The advection f ozone due to the general circulation of the atmosphere accounts for seasonal changes in the mount of ozone. "The highest ozone values during the passage of a polar front cyclone is ound near the center of the tropopause trough belonging to the cyclone." The relationship f atmospheric ozone to the formation of mother of pearl clouds is discussed and various heories on the causes of variations of atmospheric ozone are considered. *Subject Headings:* **Ozone variations 2. Nacreous clouds.**—*I.L.D.*

4.10–9 551.558.1:551.576.1

*Malkus, Joanne Starr and Bunker, Andrew F., **Observational studies of the air flow ver Nantucket Island during the summer of 1950.** *Papers in Physical Oceanography and leteorology*, Cambridge, Mass., 7(2), Oct. **1952.** 50 p. 22 tables, 48 figs., 6 refs. *Woods ole Oceanographic Institution, Contribution*, No. 617. **DWB**—This study is concerned with he "relations between the convective motions, their energy sources, and the structure of the tmosphere prior to their outset." The latter is described in terms of the parameters of emperature, humidity, velocity, turbulence and their spatial distribution over Nantucket sland. The observational program was based primarily upon airplane measurements of emperature, humidity and turbulence and supplemented by routine airport observations, ilot balloon and observations on Tuckernuck Island and observations on water temperature round Nantucket. Eight individual case studies involving varying degrees of cumulus roduction and absence of convection were studied during Aug. 1950. The data are presented or each case in tables and graphs together with photographs of clouds, and their significance discussed. *Subject Headings:* **1. Air flow over islands 2. Convection 3. Nantucket Island, Iass.**—*I.L.D.*

4.10–10 551.586:616

†Rodenwaldt, Ernst (*ed.*), **Welt-Seuchen-Atlas, Teil I. World atlas of epidemic diseases. t. I.** Hamburg, Falk-Verlag, **1952.** 130 p. 41 basic and numerous special maps. Numerus tables, figs., refs. **DLC**—This monumental work, sponsored by the Bureau of Medicine nd Surgery, U. S. Navy, is planned to cover the distribution of diseases over the whole world s well as the development of selected epidemics in the past. Pt. I is chiefly devoted to urope and the Mediterranean regions and gives also results of special German studies related o the two World Wars. An important feature of the atlas is the emphasis given to climatic actors throughout the text and in the maps. Numerous statistics and graphs characterize he seasonal variations of diseases and their connection with climate. Map No. 4 shows the elation between seasonal prevalence of typhoid fever and climatic continentality in Europe. he atlas also contains five special climatic maps worked out by KNOCH, the best ones avail-

able for Europe as a whole (1:10,000,000), covering also part of Near East and of North Africa (text p. 109–112, 50 refs.). Map No. 34 gives the annual distribution of precipitation mainly for the period 1901–30. Maps No. 35–37 show Jan., July and annual temperatures not reduced to sea level. Map No. 38 presents the annual range of temperature. Difference of isotherm on all maps, 2°C. *Subject Headings:* **1. Medical climatology 2. Climate charts 3. Europe 4. Mediterranean Region. I. Knoch, Karl II. U. S. Navy. Bureau of Medicine and Surgery.**—*A.A.*

4.10–11 551.510.4:546.33:551.510.535

Saha, Arun Kumar, **Sodium in the upper atmosphere.** *Indian Journal of Physics* 25(8):375–386, Aug. **1951.** table, 23 refs., 4 eqs. **DLC**—The paper first surveys the available data for the sodium phenomena in the upper atmosphere, namely, intensity variations of the D-lines in the night airglow and in the twilight flash, the height of the emitting layers, the distribution of sodium in the atmosphere and its probable source. The various excitation processes, both regarding the twilight flash and the night airglow emission are closely examined. It is shown that the most probable mode of production of the twilight flash is resonance excitation of neutral sodium atoms in 35–65 km region by solar radiation λ 5893, there being no significant effect of zone screening. The possible excitation processes in the night airglow are examined critically on the assumption that the height of the emitting layer is 250 km (as obtained by BARBIER and ROACH) and that above 100 km sodium exists wholly in the ionized state (as shown by BATES). Two possible excitation processes are examined: 1) Radiative recombination of Na^+ ions and 2) mutual neutralization of Na^+ and O^- ions. Of these two processes the latter seems more probable as the former requires impossibly high concentration of Na^+ ions. But the latter process cannot maintain the observed intensity of the radiation throughout the dark hours of the night. Hence, it is concluded that extra-terrestrial particles must be bombarding the upper atmospheric regions, ionizing and/or exciting the neutralized Na^+ ions. Alternatively, it may be assumed that sodium atoms are entering the atmosphere from interplanetary space. *Subject Headings:* **1. Sodium spectra 2. Atmospheric composition 3. Light of the night sky.**—*Author's abstract.*

4.10–12 551.594.2

†***Thunderstorm electricity.** Horace R. Byers (*ed.*). Chicago, Univ. of Chicago Press **1953.** 344 p. figs., tables, refs. at end of each chapter, eqs. Price: $6. **DLC, DWB**—This important "Compendium" of present day knowledge of thunderstorm electricity and associated phenomena and applications is an outgrowth of the Conference on Thunderstorm Electricity which was held at Chicago on April 10–14, 1950 under the auspices of the U. S. Air Force Geophysical Research Directorate. The report of that conference was published in Oct. 1951 and individual articles have been abstracted separately (*see* Byers, 3.5–169; Weickmann 4.1–167; Kuettner, 3.8–225; Gunn, 3.8–223; Wait, 4.10–261; Holzer, 4.4–117; Norinder, 3.8–226; Newman, 3.9–234; Harder, 3.5–280; Norinder, 3.5–282 and Newman, 4.5–230 in 1951 and 1953 issues of *MAB*). In addition to articles mentioned above, articles by Workman Loeb, Chapman and Gish were presented. The present volume contains most of these papers properly edited and in some cases revised and improved. In addition there is an excellent article by H. Israel on the atmospheric electric field and its meteorological causes (Chap. II); one by L. Koenigsfeld on atmospheric potential gradient (Chap. III); one by Malan and Schonland on charge distribution determined by lightning measurements (Chap. XI); field changes due to lightning discharges by Pierce and Wormell (Chap. XII); Norinder's article on long distance location of thunderstorms by sferics (Chap. XIV); and an introduction by Horace R. Byers (Chap. I). Other articles concern thunderstorm structure and dynamics (Byers and Braham (Chap. IV); thunderstorm electricity in relation to rain and snow particle by Chapman (Chap. IX); measurement of charges on precipitation particles by Gunn (Chap. VIII) and aircraft and lightning by Newman (Chap. XV). This gives a glimpse of the comprehensiveness of this excellent collection of papers, most of which contain a great deal of experimental data and numerous references to the most important literature in each specialized field. The work is amply illustrated with line drawings and photographs of equipment. *Subject Headings:* **1. Thunderstorm electricity. I. Byers, Horace R.** (*ed.*) **II. Conference on Thunderstorm Electricity, Univ. of Chicago, April 1950.**—*M.R.*

GENERAL METEOROLOGY

4.10–13 551.5

Reichelderfer, F. W., **Weather resources.** *World Meteorological Organization, WMO Bulletin,* 2(1):2–5, Jan. **1953. DWB**—Recent developments in applied meteorology, artificial rain making and international exchange of meteorological information are outlined. Relations with other U.N. specialized agencies are noted. *Subject Headings:* **1. Applied meteorology 2. World Meteorological Organization.**—*M.R.*

4.10–14 551.5(02)

*Çölaşan, Umran Emin (*Div. of Micrometeorology, Turkish Met. Serv.*), **Pratik meteoroloji.** [Practical meteorology.] *Meteorolojik Yayinlar Seresi,* Ankara, No. 1, **1944.** 204 p. 49 figs., tables. Price: 200 Piasters. **DWB**—An elementary textbook on physical and chemical properties of the atmosphere and on basic meteorological phenomena such as temperature, precipitation, humidity, cloudiness, evaporation, pressure and winds (with the large scale winds and some special winds treated). Meteorological instruments are described and illustrated and their use is explained. The emphasis is on instruction for observation on the amateur or co-operative station level. *Subject Headings:* **1. Elementary meteorology 2. Turkish language 3. Textbooks.**—*G.T.*

4.10–15 551.5(02)

Germany. Reichswetterdienstschule, **Leitfäden für den Gebrauch an der Wetterdienstschule, 1–8.** [Guides for use at the weather service school, Pt. 1–8.] Berlin, Pub. by the Wetterdienst, **1941–1942.** fig., tables, forms, refs. Pt. 1, (34 p.) **Allgemeine Meteorologie,** [General meteorology], by F. Möller; Pt. 2, (23 p.) **Instrumentenkunde,** [Instrument science], by Karl Keil; Pt. 3, (8 p.) **Literatur-Hilfsmittel des praktischen Meteorologen,** [Bibliographic aids for the practical meteorologist], by Karl Keil; Pt. 4, (35 p.) **Wetterkarteneintragung,** [Plotting of weather charts], by Johannes Siegel and —— Helbig; Pt. 5, (10 p. and appends.) **Militärischer Wetterdienst,** [Military weather service], by Dr. Fritz; Pt. 6, (12 p.) **Meteorologische Fremdwörter,** [Foreign meteorological words]; Pt. 7, (13 p.) **Aerologie und aerologische Eintragungen,** [Aerology and aerological plotting], by Johannes Siegel, —— Schmidt, and — - Teichmann; Pt. 8, (12 p.) **Instrumenten-Übungen,** [Instrument exercises], by Karl Keil and W. König. **DWB**—A course in meteorology simplified for the quick training of wartime meteorologists. Pt. 5 discusses the importance of meteorology during military operations, Pt. 3 contains a great number of meteorological and climatological references. *Subject Headings:* **1. Meteorology 2. Textbooks 3. Military meteorology. I. Möller, Fritz II. Keil, Karl III. Siegel, Johannes IV. König, W.**—*A.A.*

4.10–16 551.5(02, 09)

Hanzlík, Stanislav (*Prof. of Met., Prague Univ.*), **Základy meteorologie a klimatologie.** [Rudiments of meteorology and climatology.] 2nd enl. and rev. ed. Prague, Česká Grafická Unie, **1947.** 253 p. 16 photos, 80 figs., 40 tables, 8 charts. Price: 150 Kčs. **DWB**—The introduction sums up the history of popular and scientific meteorology and climatology and defines the concepts meteorology and climatology. The section on meteorology deals with physical and chemical properties of the atmosphere, with insolation, with basic meteorological elements and with the general circulation. The climatological section gives descriptions of the climates of all major geographic areas of the earth. Good cloud photographs and world meteorological charts are appended as well as lists of international symbols. *Subject Headings:* **1. Meteorology 2. Climatology 3. History of meteorology 4. Czech language 5. Textbooks.**—*G.T.*

4.10–17 551.5(02)

Loidis, A. P. and Khaniveskiĭ, V. S., **Nachal'naia meteorologiia.** [Elementary meteorology.] Leningrad, Gidromet. Izdat., **1939.** 157 p. 92 figs., tables. **DWB**—A simplified course, covering general meteorology, useful for laymen and high school students, with an unusually complete discussion of optical phenomena (pp. 122–141). Other chapters concern radiation, soil temperature, air temperature, water in the atmosphere, air currents, acoustical

and electrical phenomena, and synoptic analysis and forecasting. *Subject Headings:* **1. Elementary meteorology 2. Textbooks.**—*A.A.*

4.10–18 551.5(02)

Ryder, T. A., **Weather whys.** London, A. G. Eliot, **1952.** 143 p. 16 plates, 19 figs. **GB-MO**—This book deals popularly with the structure of the atmosphere, weather conditions and types, forecasting, weather lore, weather control and keeping and using weather records. *Subject Headings:* **1. Meteorology 2. Popular science books.**—*C.E.P.B.*

4.10–19 551.5(04)

Wallén, Carl Christian, **Hurudant blir vädret?** [What makes the weather?] Stockholm, Bonnier, **1952.** 150 p. 13+ figs., table. Price: Kr 5:75, foreign 7:50. **DLC**—A simple scientific account of meteorological principles and practice and weather phenomena for the layman. The author describes the most common meteorological instruments and their use and the operation of a weather station. The physical processes involved in the formation of high and low pressure, of the various common types of clouds and of wind; the construction and interpretation of synoptic charts; air masses, fronts, cyclones, weather change with passage of cyclones; analysis of synoptic maps; upper air investigations; and local weather phenomena such as afternoon showers, land and sea breezes, Baltic Sea weather and mountain weather are reviewed. Various weather proverbs are tested. Diagrams, synoptic maps and photographs of clouds are included. *Subject Heading:* **1. Elementary meteorology.**—*I.L.D.*

4.10–20 551.5(09)(494)

*Bider, Max, **Geschichte der meteorologischen und klimatischen Forschung im Baselgebiet 1900–1949.** [History of meteorological and climatological research on the Basel area, 1900–1949.] *Naturforschende Gesellschaft in Basel, Tätigkeitsberichte*, v. 18:56–63, 1948/1949. Pub. 1950. Port. of Dr. Wilhelm Bührer, table, refs. Abstracted from reprint. **DWB**—First records in Basel region were made at Liestal (1879) and Langenbruck (1885). First study of rainfall of region made by R. HUBER (1892) and on the climate of region by A. RIGGENBACH (1898). Most important contributions were made by DR. W. BÜHRER (1862–1927) who established a meteorological station at Buus in 1888 and continued it until death. He published articles on temperature in soil under a snow cover in 1895 and 1900, and several articles on influence of soil temperature on weather (for forecasting), on sunshine, rainfall intensity, snow, etc. Since 1928 records have been kept by the Astronomical Meteorological Inst. of the Univ. of Basel at St. Margarethen Observatory. *Subject Headings:* **1. History of meteorological stations 2. Long period records 3. Soil temperature under snow 4. Basel Canton, Switzerland.**—*M.R.*

4.10–21 551.5:015(82) 91:015(82)

†Fochler-Hauke, Gustav, **Geographische Forschung und Lehre in Argentinien.** [Geographical investigation and teaching in Argentine.] *Erdkunde*, 7(1):40–48, **1953.** numerous refs. **DLC**—The work lists and briefly discusses publications, mostly since 1940, but a few earlier, under the heads: geographical investigation, hydrography, meteorology, plant geography, animal geography, anthropogeography, landscape, cartography, geopolitics, geography in the universities and geographical societies. *Subject Headings:* **1. Bibliographies 2. Geographical research 3. Argentina.**—*C.E.P.B.*

4.10–22 551.5:021(09)

Keil, Karl, **Die Wetterdienstbibliothek im Laufe eines Jahrhunderts.** [The Weather Service Library in the past 100 years.] *Germany. Deutscher Wetterdienst in der US-Zone, Berichte*, No. 42:16–17, **1952.** fig. **DWB**—Growth of library of Prussian Meteorological Institute from 7177 volumes in 1891 to over 61,000 in 1951. *Subject Headings:* **1. Meteorological libraries 2. Prussian Meteorological Institute.**—*C.E.P.B.*

4.10–23 551.5:06(09)(914)

Estoque, Mariano A. (*comp.*) (*Weather Bureau, Manila*), **History of the National Weather Service and present meteorological research in the Philippines.** [Paper presented at] Inter-

ational Association of Meteorology, Brussels Assembly, Aug. **1951.** 6 p. Mimeographed. ramped on cover-title: Philippine Geodetic and Geophysical Institute, San Nicolas, Manila. **WB**—The Philippine Weather Service began as a private observatory in 1865. In 1884 a panish royal decree established the meteorological service of the Philippines. It was the first issue typhoon warnings; its research was confined mostly to climatological processing of bserved data. Extensive research began after World War II. Radiosonde observation ations and a bipartite microseismic station for typhoon detection were established. The roblems being investigated are: air masses in the Philippines (MARIANO A. ESTOQUE), disurbances in geostrophic flow, relationship between microseisms and atmospheric disturbances ARTURE ALCARAS) and rain forecasting. *Subject Headings:* **1. Philippines. Weather Bureau History of meteorological services 3. Meteorological research 4. Philippine Islands.**—*L.D.*

4.10–24 551.5:06(44)

France. Météorologie Nationale, **Ce qu'est la météorologie française.** [French meteorogy.] Paris, **1950.** 32 p. 23 figs., appends. **DWB**—LAVOISIER intended to organize a etwork in 1781 just before his death, but it was not until 1854 that LE VERRIER organized a etwork of 21 stations (15 in France) that telegraphed reports twice daily to Paris. Developents in meteorological service to date are given in detail, and the present organization of he National Meteorological Service and the Services of Madagascar, Indochina, Oceania and orth Africa described, illustrated and the networks of stations shown on maps of the respective areas. *Subject Headings:* **1. Meteorological organizations 2. Meteorological networks 3. France. Météorologie Nationale 4. France 5. French colonies.**—*M.R.*

4.10–25 551.5:06

Hughes, J. (*Off. of Naval Res.*), **The support of meteorology by the Office of Naval Research.** *Weatherwise*, 5(5):108–110, Oct. **1952.** 4 figs. **DWB**—The Geophysics Branch of he Office of Naval Research is primarily interested in fundamental research in meteorology. escriptions of some of the research projects supported by ONR and the names of some of the search directors are given. These include: research on the general circulation (C.-G. OSSBY), deepening of storms (H. G. HOUGHTON), marine meteorology (B. HAURWITZ), cloud hysics (E. J. WORKMAN and W. GROZIER), geographical distribution of sea-salt nuclei (A. OODCOCK), shapes and properties of raindrops (JAMES MCDONALD), microseisms (J. B. ACELWANE and M. EWING), theoretical meteorology (W. J. BAUM) and application of high peed electronic computers to meteorological data (J. CHARNEY and J. VON NEUMANN). *ubject Headings:* **1. Meteorological research projects 2. U. S. Office of Naval Research.**—*L.D.*

4.10–26 551.5:37

Beck, Niels, C. (*St. Louis Univ., Ill.*), **Curriculum differences in meteorological education.** *merican Meteorological Society, Bulletin*, 33(10):442–443, Dec. **1952. MH-BH**—The author ompares and analyzes the undergraduate curricula and their aims at a number of U. S. universities. A minimum undergraduate curriculum in professional meteorology is proposed: ynoptic laboratory—28 hours; General synoptic and descriptive—7 hours; Instruments and bservations—3 hours; Dynamic and physical—6 hours; Climatology—3 hours; others—3 ours. *Subject Headings:* **1. Teaching of meteorology 2. Meteorological curricula.**—*I.L.D.*

4.10–27 551.5:92

Struve, Otto (*Calif. Univ. Berkeley, Astron.-Dept.*), **The award of the Bruce Gold Medal Dr. S. Chandrasekhar.** *Astronomical Society of the Pacific, San Francisco, Publications*, 4(377):55–61, April **1952.** port. **DWB**—Out of 45 astronomers who have received this ward since 1898, DR. CHANDRASEKHAR is one of the 3 youngest (41 years of age). Born ct. 19, 1910 in Lahore, trained at Madras Univ., worked under EDDINGTON, FOWLER, RUTHERORD and E. A. MILNE at Cambridge, Eng., came to U. S. (Univ. of Chicago) in 1936, worked Yerkes Observatory and was director for a time, until 1950. Editor of *Astrophysical ournal*. Wrote 3 books, a dozen monographs and more than 100 research papers. Latest

book is "Radiation Transfer" (*see item* 4.9–2, Sept. 1953, *MAB*). Discoveries cited. *Subject Headings:* **1. Chandrasekhar, S. 2. Citations 3. Biography.**—*M.R.*

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

METHODS OF OBSERVATION

See also: **Daily sea level pressure autocorrelation, N. Hemisphere** (Schumann, van Rooy), 4.10–12; **Testing results of air pressure values for main synoptic information stations,** 4.10–160; **Ageostrophic mean flow** (James), 4.10–167.

4.10–28 551.501.7:551.312.2

Rath, U. C. W., **Pilot-balloon observations in the Sudan.** *Meteorological Magazine* London, 81(966):375–378, Dec. 1952. fig., tables, ref. **MH-BH**—Analysis of heights and distances reached by pilot balloons over Sudan suggest that limitations of visibility by dust and haze are not so great as formerly supposed and with improved equipment and training heights of 30–40,000 ft should be attainable. *Subject Headings:* **1. Pilot balloon observations 2. Sudan.**—*C.E.P.B.*

4.10–29 551.501.7

Skalínski, Tadeusz, **O celu i metodzie sondowan aerologiznych.** [The object and method of aerological soundings.] *Poland. Panstwowy Instytut Hydrologiczno-Meteorologiczny Wiadomósci Sluzby Hydrologicznej i Meteorologicznej*, 3(1):43–56, **1951.** 15 figs., 19 eqs. **DWB**—Some theoretical information useful for accurate analysis and utilization of results of aerological soundings is presented and discussed. It concerns the thermodynamic aspects of vertical movements of air masses; conditions of atmospheric equilibrium; the level of condensation and free convection; and the determination of the type of air masses on the basis of soundings. The second part of the paper is devoted to sounding by means of a "Lang" radiosonde. This includes information on the general principle of its operation, measurements of temperature, humidity and pressure as well as the method of calibration. *Subject Headings.* **1. Upper air soundings 2. Radiosondes 3. Lang radiosonde.**—*A.M.P.*

4.10–30 551.501.7(02)

U. S. Air Weather Service, **SKEW T—log p DIAGRAM, AWS MPC 9–16.** *U. S. Air Weather Service, Manual*, 105–124, 105–124A, Sept. 1, 5, **1952.** 54 p. 35 figs. **DWB**—Introduction of a new aerological diagram, more convenient and more accurate than diagrams used previously. Temperature represented by equidistant slanting-skew-lines. Mixing ratio lines and potential temperature lines intersect at nearly a right angle. Detailed instructions given on how to obtain humidity and temperature characteristics, as well as thickness of layer, stability criteria, condensation, convection, inversion levels, etc. *Subject Headings:* **1. Aerological diagrams 2. Manuals.**—*A.A.*

4.10–31 551.501.8:06

Bemis, Allan C. (*M.I.T.*), **Census of radar-weather projects.** *Illinois. State Water Survey Div., Bulletin*, No. 41:193–197, **1952.** **DWB**—The U. S., British and Australian research projects on microwave propagation and studies of clouds or storms by use of radar are listed under two main headings: 1) Weather-radar research projects—of which 5 are on microwave propagation, 4 on general weather radar, 9 on cloud physics, hydrology and storm detection, and 2) Weather-radar development projects—of which 9 are on instrumentation and 5 on application. Details of each project (supporting agency, purpose and equipment) are also given. *Subject Headings:* **1. Radar weather projects 2. Microwave propagation studies.**—*W.N.*

4.10–32 551.501.8:551.510.535

Rakshit, J. (*Bengal Engr. Col. Howrah*) and Catterjee, S. D. (*Univ. Col. of Science, Calcutta*), **A new method for ionospheric height measurement.** *Science and Culture*, 17(12):520, June **1952.** ref. **DWB**—An adaptation of the coincidence method used in the study of

elayed nuclear decay improves the accuracy to about ±0.25 km ("old" method ±2.5 km). Even this accuracy can be considerably increased by improving the electronic gear. *Subject Headings:* **1. Ionospheric height measurement 2. Radio wave propagation.**—*W.N.*

4.10–33 551.501.81:551.594.5 551.501.81:551.590.25 551.510.535

McKinley, D. W. R. and Millman, Peter M., **Long duration echoes from aurora, meteors, nd ionospheric back-scatter.** *Canadian Journal of Physics*, 31(2):171–181, Feb. **1953.** figs., 6 tables, 10 refs. **DLC**—In the course of the Ottawa meteor program some unusual choes have been detected on 33 Mc. Echoes from the aurora are discussed and correlated ith visual observations. Two mechanisms of radio reflections from the aurora have been roposed but the data here presented are insufficient to favor one or the other. On Aug. 4, 948 six extremely long duration meteor echoes were observed. Since Aug. 1948, a weak emipermanent echo has been recorded, usually appearing at a range of about 80 km., and nduring up to an hour. It is suggested that this echo is due to backscatter from the same ources in the lower E-region that are presumed to be responsible for long-range very high requency propagation. *Subject Headings:* **1. Radio echoes from auroras 2. Meteor trails . E layer.**—*Authors' abstract.*

4.10–34 551.501.81:551.515.81:551.594.221

Marshall, John Stewart, **Frontal precipitation and lightning observed by radar.** *Canadian ournal of Physics*, 31(2):194–203, Feb. **1953.** 6 figs., 4 refs. **DLC**—A typical pattern revealed by radar) of precipitation along a cold front includes both showers containing many early vertical cells, and continuous rain characterized by uniformity below the freezing level nd the "bright band" of scanning at angles of elevation up to 30°. At wave length 3 cm, bservations of this sort reveal some of the snow above the bright band, and its trailing pattern. t 10.7 cm, little is seen of the snow, but transient echoes with duration of the order of one econd are observed, attributable to lightning. These echoes have not been detected when canning in the vertical wave length 3.2 cm, although observers have reported something of he sort at 3.2 cm when different observing techniques were used. The transient echoes occur utside, but close to, regions of rain; most frequently about one mile from the top of a shower ell. It is probable, combining 3.2 cm observations of snow on one occasion with 10.7 cm bservations of the transients on another occasion, that the transients occur in regions not nly near rain, but at the same time in or near a region filled with snow. *Subject Headings:* **Radar storm detection 2. Sferics on radar 3. Frontal structure 4. Lightning.**—*Author's bstract.*

4.10–35 551.501.81:551.578.11:551.508.765

Massachusetts Institute of Technology, Dept. of Meteorology, **Progress Report No. 7, eriod Jan. 1–March 31, 1952.** Contract DA-36-039-sc-124, March **1952.** 9+p. fig., ppend. **DWB**—Studies on the correlation of rainfall rate and radar echo intensity, on radar gnal fluctuations and on cloud or precipitation physics are reported in general terms. The evelopment of a mechanical disdrometer for measuring raindrop size distribution in flight mentioned. Progress achieved in preparing a manual for the use of radar CPS-9 in synoptic eteorology is announced. *Subject Headings:* **1. Radar precipitation echoes 2. Raindrop ze distribution 3. Disdrometers 4. Correlations. I. Contract DA-36-039-sc-124.**—*G.T.*

4.10–36 551.501.81:551.577

Schweitzer, H., **Bestimmung der Feinstruktur von Wolken und Niederschlagsgebieten urch Zentimeter-Radarwellen.** [Determination of the fine structure of clouds and rain egions by centimeter radar.] *Umschau*, 53(11):328–329, June 1, **1953.** fig. 2 refs. **DWB**—iscussion of the difficulty of applying Rayleigh's scattering theory to "bright band" reflection f 1–10 cm radar, and summary of existing knowledge as set out by N. R. LABRUM and J. W. YDE. *Subject Heading:* **1. Bright band echoes.**—*C.E.P.B.*

4.10–37 551.501.81:551.577

Stout, G. E. and Neill, J. C. (*Urbana, Ill.*), **Utility of radar in measuring areal rainfall.** *merican Meteorological Society, Bulletin*, 34(1):21–27, Jan. **1953.** 6 figs., table, 7 refs. **MH-**

BH—Areal rainfall distribution over a 50 square mile area was observed by 3 cm radar and by a rain gage network of 33 rain gages. Isohyetal maps were prepared from both rain gage and radar observation in order to compare the rainfall distribution as observed by the two rainfall observation techniques. The computed rainfall values were at least as accurate as those obtained by a rain gage network of one gage per 200 square miles and in some cases they were considerably more accurate. *Subject Headings:* **1. Radar analysis of rain 2. Rain gages 3. Rainfall distribution 4. Illinois.**—*Authors's abstract.*

OBSERVATIONAL DATA

4.10–38 551.506.5(58)

Ångström, Anders, **Hedinexpeditionens resultat.** [Results of the Hedin Expedition.] *Ymer*, Stockholm, No. 3:216–220, **1951. DWB**—The meteorological results of SVEN HEDIN's 1927–1935 expedition to Central Asia have been published in v. 9(1) by WALDEMAR HAUDE and v. 9(2) by FRITZ ALBRECHT. The contents of these volumes are reviewed briefly. *Subject Headings:* **1. Expeditions 2. Central Asia. I. Hedin, Sven.**—*I.L.D.*

4.10–39 551.506.5:91.04(99)

*Liljequist, Gösta H. and Schytt, Valter, **Den norskbrittisk-svenska antarktisexpeditionen 1949–1952. Kort oversikt av det andra årets arbete.** [The Norwegian-British-Swedish Antarctic Expedition 1949–52. A survey of the second year's work.] *Ymer*, 72(4):242–257, **1952.** 7 figs. English summary p. 257. **DWB**—Brief report of scientific work on the "Maudheim" for which monthly maximum, minimum and average values of temperature and winds for 1951 are tabulated. Storm centers moved from Graham Land eastward and were associated with the NE and ENE off shore winds. East of the "Maudheim" frequent deep central cyclones over the ocean and simultaneous high pressure over the Weddell Sea, resulted in long periods of stable weather with an almost steady and cold S–SW current. Six hundred and thirty radiosonde ascents, combined with upper air wind measurements, were taken during the two years. Highest temperature, +1°C was measured in January. The extensive study of the heat exchange in the snow surface comprised: direct and global radiation, albedo, absorption and changes of temperature and wind with height in the first 10 m above the ground. Steep temperature inversions (up to 1.5°C/m) occurred in clear weather during winter. A close relation between radiation on one hand and temperature and wind on the other was observed. Systematic micro-photographs of precipitation and of ice crystals in frost, fog and frost haze were taken. The study of accumulation and ablation covered a 40 km² area of shelf-ice (190 m thick). Preliminary data show that the temperature varies in the upper layers, at 20 m it is almost constant and from 30 m it decreases slowly with depth. *Subject Headings:* **1. Maudheim Expedition, 1949–1952 2. Antarctic expeditions 3. Antarctica.**—*W.N.*

4.10–40 551.506.5:91.04(99)

Robin, G. de Q., **Norwegian-British-Swedish Antarctic expedition, 1949–52.** *Polar Record*, 6(45):608–616, Jan. **1953.** 2 figs., 3 photos. Also: Reece, Alan, **The base of the Norwegian-British-Swedish Antarctic Expedition, 1949–52.** *Ibid.*, p. 617–630. 4 figs., 3 photos, table. **DLC**—ROBIN describes general course of expedition, setting up of bases, journeys and flight routes and summarizes scientific results. REECE in the first of a series of articles describes equipment in base at Maudheim (71°6′S, 10°58′W). An Appendix gives monthly winds and temperatures 1950–51. *Subject Headings:* **1. Antarctic expeditions 2. Maudheim Expedition, 1949–52 3. Antarctica. I. Reece, Alan.**—*C.E.P.B.*

4.10–41 551.506.5(99)

Dobrowolski, Antoni Boleslaw, **Wspomnienia z wyprawy polarneg.** [Recollection of a polar expedition.] Warsaw, Prasa Wojskowa, **1950.** 102 p. illus. Price: 150 zl. **DLC**—This book, published on the 50th anniversary of the first wintering of an expeditionary vessel in south-pole ice, contains the recollections of the Polish explorer A. R. DOBROWOLSKI of the Antarctic expedition on the Belgian vessel "Belgica" in 1897–1899, excerpts from the author's diary and description of sea animals, plants and birds encountered during the voyage. The

ook concludes with some biographical information on the explorer. Remarks on weather, ow and ice conditions (sketches of ice) and navigation methods are given in narrative form. *ubject Headings:* **1. Antarctic expeditions 2. Polar ice 3. Antarctica.**—*A.M.P.*

4.10–42 551.506.5:551.581(269)

*Hanzawa, Masao; Okabayashi, Kazuo; Yoshida, Kikuji and Marumo, Ryuzo, **Report sea and weather observations on the Antarctic whaling ground (1950–1951).** *Ocean-raphical Magazine*, Tokyo, 3(4):(107)–(137), Dec. **1951.** 14 figs., 7 tables. In English. **H-BH**—Detailed account of weather and sea observations made in two different regions the Antarctic by observers of the Centr. Met. Observatory of Japan on two ships of a whaling pedition. Weather charts, and data on pressure, temperature, wind, visibility and humidity e presented. Comparison is made between weather conditions at the two whaling grounds d between conditions in 1950–51 and 1949–50. General pressure pattern, velocity and mensions of cyclones, "roaring forties," and various relations derived for purposes of weather recasting are discussed. Results of the oceanographical observations are also reported, mpared and commented on. *Subject Headings:* **1. Whaling expeditions 2. Marine meteoro-gical data 3. Antarctic weather 4. Antarctica.**—*G.T.*

4.10–43 551.506.5:551.463/4(263)

*Texas. Agricultural and Mechanical College. Dept. of Oceanography, **Physical and eteorological data, cruises 1, 2 and 3 of the U. S. Fish and Wildlife Vessel Alaska.** Contract 7onr-487, T.O. II, Project NR 083 036, Oceanographic Survey of the Gulf of Mexico, Project , Data Report No. 1, Nov. **1952.** 36+42+21 p. 4 figs., mostly tables. **DWB**—Data on eanographic and meteorological measurements made at some 120 points of the Gulf of exico during the period Apr. 1951–Aug. 1952, are included in this report. Each point is presented on one report sheet A&M Ocn. Form 7, containing a single set of measurements of ater temperature, salinity and phosphate value, at various depths. Values of meteorological ements cover temperature (dry- and wet-bulb), pressure, relative humidity, wind (speed and rection), clouds (type and amount), visibility, and general weather condition. Locations ospected are shown on charts. *Subject Headings:* **1. Oceanographic expeditions 2. Marine eteorological data 3. Gulf of Mexico.**—*G.T.*

4.10–44 551.506.7:551.557.36(68)

*Hofmeyer, W. L., **A statistical analysis of radar winds over Pretoria in winter.** *South frica. Weather Bureau, Notos*, 1(4):186–192, **1952.** 4 figs., 7 tables, 6 refs. **DWB**—Upper nds obtained by radar at Pretoria have been statistically analyzed for the winter 1952. he results indicate that these winds are on the whole north-easterly near the surface and at they frequently back through north to westerly at a fairly low level in the free atmosphere. verage velocities vary from approximately 10 knots near the surface to a maximum of the der of 60 knots at about 200 mb. Above this level, velocities decrease rapidly and directions eviate from mainly westerly at 200 mb to practically all points of the compass at 60 mb. ther statistical results are in respect of standard deviations, frequency distributions and rrelation coefficients of the west to east and south to north components and, in certain cases, the resultant vectors. *Subject Headings:* **1. Upper air wind data 2. Upper air wind analysis Pretoria, South Africa.**—*Author's abstract.*

PHENOLOGY

4.10–45 551.506.8:551.584

Baumgartner, A., **Zur Phänologie von Laubhölzern und ihre Anwendung bei lokalkli-atischen Untersuchungen.** [On the phenology of deciduous trees and its application in cal climatic investigations.] *Germany. Deutscher Wetterdienst in der US-Zone, Berichte*, o. 42:69–73, **1952.** 5 figs., table, refs. **DWB**—Observations of beech show that each tree as its own development peculiarities which must be taken into account in applying phenology local climatic studies. Examples of differences are quoted. A fairly close relation is found etween leaf development and daily mean temperature. *Subject Headings:* **1. Phenology Microclimatology.**—*C.E.P.B.*

4.10–46 551.506.8:551.5

Berg, Hellmut, **Bedeutung und Grenzen der Phänologie für die Klimatologie.** [Importance and limits of phenology for climatology.] *Germany. Deutscher Wetterdienst in de US-Zone, Berichte*, No. 42:358–361, **1952.** 2 figs., 16 refs. German and English summarie p. 358. **DWB**—Author argues that phenological data cannot be represented exactly by sum of functions of different meteorological elements (some approximations are shown) Hence, phenological data represent a climatic element *sui generis*. *Subject Heading:* **1. Phenological data.**—*C.E.P.B.*

4.10–47 551.506.

Koyano, M. **On the cherry-blossom time in Tokyo district, 1951.** *Japan. Central Meteorological Observatory, Tokyo, Memoir of Industrial Meteorology*, 15(1):75–78, May, 1951 3 figs., 2 tables. English summary p. 78. **DWB**—Cherry trees bloomed five days earlie than normally, perhaps owing to higher temperatures. A graph showing the rate of openin of flowers is given. *Subject Headings:* **1. Phenology 2. Cherry trees 3. Tokyo, Japan.**—*A.A*

4.10–48 551.506.

Schnelle, Fritz, **Über die Abhängigkeit der Laubverfärbung von der Temperatur.** [On the dependence of leaf coloring on temperature.] *Germany. Deutscher Wetterdienst in de US-Zone, Berichte*, No. 38:227–228, **1952.** fig., ref. **DWB**—Mean daily and daily minimum temperatures before and after autumn change of leaf color are set out for Geisenheim, Bamberg and Hof; minimum temperature sinks to 7°C 10–18 days before and to 6°C 6–16 days afte color change. *Subject Heading:* **1. Phenology.**—*C.E.P.B.*

4.10–49 551.506.

*Witterstein, F., **Untersuchungen an der langen phänologischen Beobachtungsreihe vo Geisenheim.** [Investigations in the long Geisenheim phenological record.] *Germany Deutscher Wetterdienst in der US-Zone, Berichte*, No. 42:313–320, **1952.** 4 figs., 2 tables, 1 refs. **DWB**—A detailed statistical study of dates of 10 phenological periods which make u the year. The scatter is greatest in early spring (snowdrop flower) and least in midsummer *Subject Headings:* **1. Phenology 2. Geisenheim, Germany.**—*C.E.P.B.*

INSTRUMENT CARRIERS

See also: **Wind estimation from state of sea observation** (U. S. Air Weather Service), 4.10–180.

4.10–50 551.507.3:551.508:681.08

Artificial weather. *Instruments*, Pittsburgh, 25(10):1464–1465, Oct. **1952. DLC**—Brie notice of a 440 cu. ft environmental test chamber recently installed by the Goodyear Aircraf Corporation, Akron, Ohio and manufactured by Tenney Engineering, Inc., Newark, N. J Temperature ranging from −100 to +200°F, humidity from 20 to 95% and pressure fron 30 to 1 in. can be produced in the chamber thus equalling weather conditions found up t altitudes of 75,000 ft. Equipment under test can be operated from outside the chamber *Subject Headings:* **1. Calibration equipment 2. Test chambers.**—*G.T.*

4.10–51 551.507.321.2:551.524.

Gifford, Frank, Jr. (*U. S. Weather Bur., Wash., D. C.*), **The breakdown of a low-leve inversion studied by means of detailed soundings with a modified radiosonde.** *American Meteorological Society, Bulletin*, 33(9):373–379, Nov. **1952.** 4 figs., 6 refs. **MH-BH**—A shor series of detailed temperature, humidity and wind soundings to a height of 750 mb were made at Silver Hill, Md., on the nights of Oct. 30 and 31, 1950 by means of 8 flights of radiosonde balloons modified for low level sounding and 26 double theodolite pilot balloons. The nocturna breakdown of the ground inversion with steep wind gradients, a phenomenon first observed by DURST in 1933, is here apparently associated with the sudden lowering of an upper (turbulent or subsident) inversion. Possibly the breakdown of the ground inversion and nearly simultaneous lowering of the upper inversion might be a diurnal process. The effect of this sudden

eakdown upon minimum ground temperature and stratus forecasting is discussed. *Subject eadings:* **1. Low level balloon soundings 2. Inversions.**—*I.L.D.*

4.10–52 551.507.352

Bellamy, John C., **Airborne navigational recorders.** *Navigation*, Los Angeles, 3(6):182–8, Dec. **1952.** 2 figs. **DWB**—Reasons for recording meteorological data during flight, -flight and post-flight requirements of such recording, and form of record which would best those requirements are discussed. The author concludes that "the use of a unitary decimal gital numerical notation satisfies the requirements of the form of record needed for air-borne vigational recorders." Some details of the proposed tape recording system are treated in a te attached by the editor (based on subsequent statements of the author). *Subject Heading:* **Air-borne instruments.**—*G.T.*

INSTRUMENTS

See also: **Artificial weather, 4.10–50.**

4.10–53 551.508

Schindler, Gerhard (*Bad Homburg*), **Über die Anzeige-Genauigkeit verschiedener me-orologischer Geräte.** [The accuracy of various meteorological instruments.] *Wetter und eben*, 4(9/10):171–173, Dec. **1952.** 5 refs. **MH-BH**—A nontechnical discussion of the degree accuracy of various automatic meteorological recorders such as thermographs, hydrographs, apor pressure recorders and barographs. Specific numerical data on accuracy are given for ch of the instrument types. *Subject Headings:* **1. Meteorological instruments 2. Recording struments 3. Instrument accuracy.**—*I.L.D.*

4.10–54 551.508:551.575

Tabata, T., **On the general equipments and measuring instruments used in the 1951 bservation of sea fogs at Ochiishi, Hokkaido.** *Journal of Meteorological Research*, Tokyo, 4, Suppl. Number, p. 175–184, March **1952.** 4 figs., tables, 10 refs. In Japanese, English mmary p. 331. **MH-BH**—An account of the elaborate equipment setup, including 10 ttice towers, 2 balloons, etc. and a large number and variety of autographic instruments. *ubject Headings:* **1. Sea fog measurement 2. Fog meters 3. Fog detectors.**—*C.E.P.B.*

4.10–55 551.508:551.43

Vitkevich, V. I. (*Moscow*), **Novye pribory dlia issledovaniia prizemnogo sloia vozdukha.** New instruments for investigating the atmospheric layer near the ground.] *Priroda*, Mos-w, 9:94–98, Sept. **1952.** 8 figs. **DLC.** Hungarian transl. by Galléri, Sándor in *Időjárás*, (11/12):356–362, **1952.**—Both the Stevenson screen and most of the instruments and ethods of meteorological observatories are designed for conditions of free ventilation; nce, for agrometeorological investigations specially designed instruments are needed since ere is no free ventilation at the level of plant growth. Detailed descriptions and photo-aphs are given of special apparatus for measuring air temperature and relative humidity means of phytopsychrometer and psychrothermograph provided with a signalling device r signalling the occurrence of a given air temperature; of special cylinders inserted into the soil r measuring soil evaporation and a special device provided with a balance for continuous cording of evaporation from the soil surface; of three types of apparatus for measuring soil mperature (for summer and winter and for the continuous recording of soil temperature); a special rain gauge for measuring precipitation and continuous recording of wind velocity thin the plant cover. *Subject Headings:* **1. Micrometeorological instruments 2. Galléri, ndor.**—*I.L.D.*

4.10–56 551.508.21

Czerny, M., Kofink, W. and Lippert, W., **Bolometer geringer Trägheit.** [Bolometer of nall inertia.] *Annalen der Physik, 6th Ser.*, 8(1/2):65–86, **1950.** 6 figs., 10 tables, 21 eqs. **LC**—A bolometer was designed by G. Heins in 1936/7 in which a thin metal layer (of such ickness as to absorb half the infrared radiation) was evaporated on to a thin celluloid mem-ane. As the metal acts both as absorber and bolometer strip, the inertia is very small and e instrument can be used in long-wave infrared. The work was taken up in 1940 at Frank-rt using bismuth (and also independently by Zeiss). The theoretical calculations involving

electrical resistance and radiation exchanges are set out and curves or tables given of relations between temperature of bolometer and constant or varying radiation, thickness of celluloid membrane, pressure, etc. Experiments not yet concluded. *Subject Heading:* **1. Bolometers.**—*C.E.P.B.*

4.10–57 551.508.21:551.521.61

Guild, Walter R., **A bolometer for measurement of atmospheric radiation.** Texas. University, Electrical Engineering Research Laboratory, Contract N6onr-266, Task Order 2, Report No. 32, Sept. 1, 1949. 30 p. 7 figs., 12 refs. **DWB**—Using thermistor beads as the sensitive elements, a bolometer has been constructed for the measurement of infra-red atmospheric radiation at night. The basic circuit consists of a bridge, two arms of which are thermistors, one shielded from radiation and the other exposed at the focus of a small parabolic mirror. The indicating circuit is a d-c amplifier feeding a recording milliammeter. The relative sensitivity of the basic bridge system is over 100 volts/watt, while the minimum intensity of radiation detectable is of the order of 10–4 cal/cm² min, with the present low-gain amplifier. The over-all probable error of a measurement of radiation is estimated to be slightly more than ±1%. *Subject Headings:* **1. Bolometers 2. Infrared radiation. I. Contract N6onr-266, Task Order 2 II. Texas. University. Electrical Engineering Research Laboratory.**—*Author's abstract.*

4.10–58 551.508.21

Jones, R. Clark (*U.S.A.F. Cambridge Res. Center*), **The general theory of bolometer performance.** *Optical Society of America, Journal*, 43(1):1–14, Jan. **1953.** 14 figs., 13 eqs. **DWB**—The emphasis in this theoretical description is on the physics rather than the mathematics of bolometer performance. The presentation is in three parts covering: 1) static performance (the load curve and its determination, dynamic resistance, zero frequency response and its determination from the load curve), 2) stability considerations (conditional stability, absolute stability), and 3) dynamic performance (electrical impedance, response). Two- and four-terminal equivalent circuits and an electrical bridge are described. *Subject Heading:* **1. Bolometers.**—*G.T.*

4.10–59 551.508.21:551.510.534

Kuwana, J. and Kira, K., **On the observations of ozone layer in the upper atmosphere by means of pyrgeometer. Part 1. New design of pyrgeometer and its recorder for ozone observations.** *Tateno, Japan. Aerological Observatory, Journal*, 5(1):83–91, March **1951.** 6 figs., 13 eqs. English summary p. 83. **DWB**—The Ångström pyrgeometer was enclosed in an oil bath of constant temperature (error less than 1/15°C). Aperture angle 18°. Scheme for an improved recorder using a d'Arsonval galvanometer, photoelectric cells, and a vacuum tube is presented and formulas for sensibility and period of recorder are derived. *Subject Headings:* **1. Pyrgeometers 2. Ozone layer measurement.**—*A.A.*

4.10–60 551.508.29

Agari, S., Morita, Y., Ito, N. and Kobayashi, T., **On the remote recording thermometers used in the sea fog observation 1951.** *Journal of Meteorological Research*, Tokyo, v. 4, Suppl. Number, p. 39–42, March **1952.** 4 figs. In Japanese, English summary p. 323. **MH-BH**—The instrument designed at Meteorological Research Institute consists of 6 mercury thermometers in the capillary of each of which a carbon filament is inserted, the ends being connected to a 6 point color thread recorder. The resistance varies with length of carbon filament free of the mercury column; specimen record shown. Accuracy 0.2°C. *Subject Headings:* **1. Thermometers 2. Remote recording equipment.**—*C.E.P.B.*

4.10–61 551.508.29

Eisner, H. S., **A simple resistance thermometer.** *Journal of Scientific Instruments*, 29(5):166, May **1952.** fig. **DLC**—Describes a small (1/4×5/16 in.) platinum resistance thermometer of very low thermal capacity. *Subject Heading:* **1. Resistance thermometers.**—*C.E.P.B.*

4.10–62 551.508.29

Höhne, W., **Kompensation des Strahlungsfehlers beim Thermoelement und beim Widerandthermometer.** [Compensation for radiation error in thermo-element and resistance ermometer.] *Germany. Deutscher Wetterdienst in der US-Zone, Berichte*, No. 42:82–85, 952. 4 figs., 4 refs., 19 eqs. **DWB**—The thermo-element includes 4 junctions, of which rors of *a* and *c* compensate *b*; *d* is in constant temperature bath; error less than 0.02°C. The mpensation of the resistance thermometer is on a similar principle. A method of calculating ie error is described. *Subject Heading:* **1. Resistance thermometers.**—*C.E.P.B.*

4.10–63 551.508.29:551.508.71

Isono, K. (*Tokyo Univ.*) and Hayashi, E. (*Met. Res. Inst.*), **Note on the thermistor psyhrograph for the sounding of the lower atmosphere.** *Papers in Meteorology and Geophysics*, (2):125–137, Aug. **1952.** 12 figs., 3 tables, 8 refs. **MH-BH**—The characteristics of the ermistor psychrograph for the sounding of the lower atmosphere are described. The time g constant of thermistors and their psychrometric constant under various ventilation condi- on are determined. The effect of solar radiation on the temperature of thermistors in diation shield are analyzed. Several results of the sounding with a captive balloon are scussed. *Subject Headings:* **1. Thermistor psychrographs 2. Solar radiation effects 3. Balon soundings.**—*Authors' abstract.*

4.10–64 551.508.29

Koitzsch, R., **Untersuchungen über den Temperaturkoeffizienten einer Registriereinchtung für kleine Thermospannungen.** [Investigations on the temperature coefficients of a cording device for small thermoelectric voltage.] *Zeitschrift für Meteorologie*, 6(11):336–339, ov. **1952.** 3 figs. **MH-BH**—A description of a temperature measurement and recording evice, especially suitable for microclimatic investigations, that was developed at the agriltural meteorology research station, Müncheberg. It consists of a direct current voltage agnitude amplifier ("Visomat" Leipzig) which works according to the compensation proedure of "constant resistance," "variable current." To the amplifier there is attached a oint recorder (six color recorder "Ortex"). A detailed description of the apparatus together ith a circuit diagram is given and the calibration of both parts is illustrated. The attempt as made to make the temperature coefficient of the apparatus so small that temperature ariations between 10 and 25°C at the point would not be required to be taken into account evaluating the recordings. *Subject Headings:* **1. Micrometeorological instruments emperature instruments.**—*I.L.D.*

4.10–65 551.508.49

Mielenz, Klaus-Dieter and Schönheit, Eberhardt, **Zur Theorie des Quarzfadenanometers.** [On the theory of the quartz thread manometer.] *Zeitschrift für angewandte hysik*, 5(3):90–94, **1953.** 3 figs., table, 5 refs., 20 eqs. **DLC**—The theory of quartz thread anometers with one and two thread, for measurement of very low pressures, is discussed and ie constants are verified experimentally. *Subject Heading:* **1. Manometers.**—*C.E.P.B.*

4.10–66 551.508.5

Sanuki, M.; Kimura, S. and Tsuda, N., **Studies of biplane wind vanes, ventilator tubes nd cup anemometers, (Supplementary report).** *Papers in Meteorology and Geophysics*, (3–4):317–333, Dec. **1951. MH-BH**—Report on numerous technical tests. Among the roblems studied is the effect of blade thickness upon the influence of turbulence, the effect the number of blades, comparison of the Japanese wind vanes with Bendix-Friez Aerovane, scillation characteristics of conventional pressure tube and wind vane, and ventilating apacity of some actual radiosonde ventilator tubes (Japanese and U. S. Army type). *Subject eadings:* **1. Wind measurement 2. Wind vanes 3. Instrument comparisons.**—*A.A.*

4.10–67 551.508.952:551.510.41

Jessel, U., **Über die Eignung von Frittfilterwaschrohren für Ozonanalysen atmosphärischer uft.** [The adaptation of the cohesion filter tubes to analysis of ozone in the atmospheric air.] *ermany. Deutscher Wetterdienst in der US-Zone, Berichte*, No. 42:344–349, **1952.** 2 figs., 5

tables, 9 refs. **DWB**—Results of measurements of ozone with the apparatus developed by H. CAUER and A. EHMERT are compared. The former gives less than half the latter, which gives the true value. Causes of difference are discussed. *Subject Heading:* **1. Ozone meters.** —*C.E.P.B.*

4.10–68 551.508.96

Blair, J. C., Brown, J. N. and Watts, J. M. (*Natl. Bureau of Standards, Wash., D. C.*), **An ionosphere recorder for low frequencies.** *Journal of Geophysical Research*, 58(1):99–107, March **1953.** 6 figs., 4 refs. **DWB**—Application to the low frequency case of techniques heretofore used in high frequency ionosphere recorders is described. The beat frequency method of generating wide frequency sweeps is used, covering frequencies from 50 kc to 1,000 kc in a short time without band switching. Advantage is gained by the use of transformers containing ferromagnetic cores in the wide-band transmitter amplifiers, but the antenna system, for practical reasons, is very inefficient. Sample records are shown. *Subject Heading.* **1. Ionospheric recorders.**—*Authors' abstract.*

4.10–69 551.508.99:537.57

Naumann, A. (*Siemens & Halske, Karlsruhe*), **Ein einfaches Gerät zur Messung des pH-Wertes.** [A simple instrument for measuring pH values.] *Umschau*, Frankfurt a.M., 52(19):590, Oct. 1, **1952.** 3 figs. **DLC**—An electrode instrument with direct reading and an accuracy of ±0.5 pH is described and illustrated. Purpose of the instrument is to measure pH values of hydrogen ion concentration in liquids of prevalently aqueous composition. Soil tests in horticulture, agriculture or geology, and tests of drinking water or various liquids used in industry are indicated as primary fields of application. *Subject Headings:* **1. Ionization of liquids 2. Hydrogen ion meters.**—*G.T.*

SYNOPTIC ANALYSIS AND FORECASTING

See also: **Large scale weather, Central Europe,** 4.10–5; **Evaporation lability charts, summer 1951** (Faust), 4.10–112; **Use of upper air temp. for winter rainfall forecasting, Punjab** (Rao), 4.10–155; **Artificial surface coloration as example of "physical catalysis"** (Ehrenberg), 4.10–156; **Testing results of air pressure values for main synoptic information stations,** 4.10–160; **Strong winds and their forecasting, Allahabad** (Sinha), 4.10–175; **Biosynoptics** (Seilkopf), 4.10–241.

4.10–70 551.509.312

Charney, J. G. and Phillips, N. A., **Numerical integration of the quasi-geostrophic equations for barotropic and simple baroclinic flows.** *Journal of Meteorology*, 10(2):71–99, April **1953.** 16 figs., table, 26 refs., 132 eqs. **MH-BH**—The numerical prediction of large-scale quasi-geostrophic motion is extended from 2 dimensions to motion in terms of 2 dependent variables along each vertical ("2½ dimensional model"). The equations are set out and a scheme of numerical calculation with an electronic computer described, using a 169 point grid over eastern N. America. Examples of barotropic and 2½ dimensional 12 and 24 hr forecasts of 500 and 700 mb levels are shown for Nov. 23–26, a period of unusually rapid baroclinic development. The 2½ dimensional forecasts were consistently superior; errors are attributed to low-level thermal asymmetries and to the crudity of using only 2 parameters for vertical structure. A machine computation scheme is proposed using the general 3-dimensional equations. *Subject Heading:* **1. Numerical forecasting.**—*C.E.P.B.*

4.10–71 551.509.312:551.511

Fjørtoft, Ragnar (*Univ. of Copenhagen*), **On a numerical method of integrating the barotropic vorticity equation.** *Tellus*, 4(3):179–194, Aug. **1952.** 5 figs., 2 tables, refs. **MH-BH**—A method is given by means of which quasi-permanent "velocity" fields may be constructed in which absolute vorticity is conserved if the atmosphere is treated as barotropic. For vorticity displacements these fields may be considered as constant for time intervals of the order of magnitude 24 hrs. Some simple approximate integration formulae are given for the Poisson- and Helmholz-equations. A graphical procedure is introduced to derive the isolines of

orticity and to perform the integration work. *Subject Headings:* **1. Numerical forecasting 2. Vorticity equations.**—*Author's abstract.*

4.10–72 551.509.312

Gates, W. Lawrence, **A method of numerical forecasting by juxtaposition of one-dimensional solutions, and its application to the equivalent barotropic model.** *Journal of Meteorology*, 0(2):149–159, April **1953.** 5 figs., 8 tables, 9 refs., 4 eqs. **MH-BH**—Large-scale disturbances ehave much as if they are embedded in a zonal current, and for short periods may be regarded s one-dimensional. This is applied to the equivalent barotropic model of CHARNEY and ELIASSEN, and a method of numerical evaluation is described by which values can be calculated or different latitudes and combined. Working tables are given. A 24-hour forecast using a 0°grid can be worked out in 60–90 min. Examples of forecast changes of 500 mb contours ompare well with synoptic forecasts, and it is suggested that this objective method could sefully supplement the latter. *Subject Heading:* **1. Numerical forecasting.**—*C.E.P.B.*

4.10–73 551.509.312:551.513.2

Sumner, E. J., **The application of wave-length ideas in forecasting.** *Meteorological Magazine*, London, 82(971):148–154, May **1953.** 7 refs., 2 eqs. **MH-BH**—SUMNER described xperience in Forecasting Research Branches, Dunstable, on application of Rossby wave speed ormula to forecasting long waves. Shorter waves may be stable or unstable; the latter hen growing rapidly may disrupt long waves and complicate forecasting. ROSSBY's formula as put in form $C=\frac{\beta}{4\pi^2}(L_s^2-L^2)$ where $L_s=2\pi(U/\beta)$ is the stationary wave length. Measrement of parameters is described. Graphical evaluation takes only 3–4 min. Some rules or deciding when formula can be used on 500 mb situation. A considerable discussion followed. *Subject Headings:* **1. Kinematic analysis 2. Waves in the westerlies.**—*C.E.P.B.*

4.10–74 551.509.312

Syoono, S. and Gambo, K. (*Geophys. Inst., Tokyo Univ.*), **On numerical prediction (II, II).** *Meteorological Society of Japan, Journal, 2nd Ser.*, 30(8, 9):264–271; 273–280, Aug., ept. **1952.** 11 figs., 9 refs., 8 eqs. **DWB**—Some inaccuracies existing in the method eveloped in Pt. I of this paper (*see item* 2.4–31, April 1951, *MAB*) are corrected by increasing he number of terms in the Fourier series. The new formulas are tested with good results gainst the spectral function of the height profile of the 500-mb surface. The results are ompared with those obtained by applying CHARNEY's method. Pt. II, spacial and time orrelation coefficients of changes in pressure patterns are then analyzed by means of double ourier series and predicted pressure patterns are obtained by a synthesis of each component. Numerical examples of the application of the elaborate method are offered in Pt. III. *Subject Headings:* **1. Numerical forecasting 2. Statistical forecasting.**—*G.T.*

4.10–75 551.509.312

Thompson, Philip D. (*U. S. Air Force*), **Notes on the theory of large-scale disturbances in tmospheric flow with applications to numerical weather prediction.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 16, July **1952.** 106 p. 9 figs., ibliog. p. 105–106, eqs. **DWB**—The problem of predicting the behavior of large-scale isturbances in the mean horizontal flow of the earth's atmosphere, which is directly connected ith the problem of predicting the day-to-day changes of surface weather conditions, has been tudied from the standpoint of formulating and solving the hydrodynamical equations which overn the flow. Owing to the difficulty of solving the complete system of equations (whose ery generality implies the existence of several irrelevant, but possible, types of solutions), it is onvenient to develop a "scale theory" whereby the various possible types of atmospheric notion, each corresponding to a distinct type of solution, can be distinguished and classified. As it turns out, each type of motion is characterized by its phase speed and frequency. The arge-scale disturbances, for example, are distinguished from all other types of motion by the act that their characteristic phase speed is much less than that of sound waves and of high-peed internal gravity waves. By explicitly introducing this information into a mean vorticity quation for adiabatic flow, it is then possible to reduce the system to a single equation from

which the extraneous solutions have been excluded and which is otherwise free of major difficulties. The resulting "prognostic equation," which governs the large-scale motions of a fictitious two-dimensional atmosphere, forms the basis for a method of numerical prediction. An iterative scheme, based on the solutions of a succession of linear equations, has been proposed for solving the nonlinear prognostic equation. In the course of developing this method, the complete solutions for forced oscillations induced by irregular terrain and for linear transient disturbances have been presented in readily computable form, in terms of known initial values and the appropriate GREEN's function. Finally, the prediction formulas for large scale transient disturbances have been applied to observed initial data, with generally favorable results. *Subject Heading:* **1. Differential kinematics.**—*Author's abstract.*

4.10–76 551.509.33:519.24(52)

Kitada, M., **Seasonal forecasting by correlation chart.** *Journal of Meteorological Research*, 3(9):312–313, July **1951.** figs. In Japanese. **DWB**—Charts show application of method to Far East. *Subject Headings:* **1. Seasonal forecasting 2. Statistical forecasting 3. Correlation charts 4. Japan.**—*M.R.*

4.10–77 551.509.33:517.512.2

Kobayashi, T., **On the periods of some meteorological elements.** *Society for the Long-Range Forecast Research of Tohoku District, Journal*, 11(1):18–22, March **1951.** tables, graphs. In Japanese, English summary p. 52; headings in English. **DWB**—Author gives some results of periodogram analysis of temperatures at Mt. Iwate and heavy precipitation and low temperature at Sendai. Predictions from these are compared with observations. *Subject Headings:* **1. Periodograms 2. Long range forecasting 3. Mt. Iwate, Japan 4. Sendai, Japan.** —*C.E.P.B.*

4.10–78 551.509.33

Rubin, Morton J. (*Mass. Inst. of Tech., Cambridge*), **Southern Hemisphere synoptic analysis.** *American Meteorological Society, Bulletin*, 33(10):409–415, Dec. **1952.** 4 figs., table, 2 refs. **MH-BH**—The principal objective of the Southern Map Analysis Project is to provide a tool for extended weather forecasting. The history of the project, its synoptic hours, base map plotting of reports and station network, and technique of map analysis are discussed. A sample of map analysis for March 18–20, 1949 is given. *Subject Headings:* **1. Extended forecasting 2. Synoptic analysis 3. Southern Hemisphere Map Analysis Project.**—*I.L.D.*

4.10–79 551.509.33

von Rudloff, H., **Statistische Betrachtung einiger Witterungsfolgen.** [Statistical consideration of some weather sequences.] *Meteorologische Rundschau*, 6(3/4):45–48, March/April **1953.** 8 tables, 10 refs. **MH-BH**—Suggested systematic relations in central Europe between temperature in one month or part of a month and temperature or precipitation in a later month, e.g. cold Jan. and mild Feb. give a warm July, are examined using data for Freiburg, to test their value for long range forecasting. Some of the rules are moderately successful but usually they are only valid locally. *Subject Headings:* **1. Seasonal forecasting 2. Germany.**—*C.E.P.B.*

4.10–80 551.509.5

American Meteorological Society. District of Columbia Branch, **Local objective forecast methods symposium.** [**1952.**] 16 p. Mimeo. **DWB**—A report of the verbal proceedings of two conferences on Objective Forecast Methods (except for several papers read at the first meeting, which have been published elsewhere). The first session took place at the National Academy of Science on Jan. 23, 1952 and consisted of remarks on the qualifications of the panel members (R. C. BUNDGAARD, ROGER A. ALLEN, MR. LYNN MEANS, REINHARDT C. SCHMIDT and IRVING GRINGORTEN). Other authorities who took part in the panel discussion on Jan. 24th were Major Gen. SENTER of the Air Weather Service, Brig. Gen. J. J. GEORGE, ROBERT BEEBE, WOODROW DICKEY, WOODROW JACOBS, CONRAD MOOK and JACK THOMPSON. Each one added his opinions to the discussion of the objectives of objective forecasting, and

he limitations and application thereof. *Subject Headings:* **1. Objective forecasting 2. Meeorological conferences 3. Local forecast studies. I. U. S. Air Weather Service II. Bundgaard, R. C.**—*M.R.*

4.10–81 551.509.5:551.579

Gasser, O., **Die Vorhersage der Wasserspiegelhöchststände und der stärksten Anstiege vom Bodensee.** [Forecasting the highest water levels and the most rapid rises of Lake Constance.] *Germany. Deutscher Wetterdienst in der US-Zone, Berichte*, No. 35:71–75, **1952.** 4 figs. **MH-BH**—Height 0°C isotherm (from radiosondes) and extent of snowfields in Alps give basis for forecasting water level 10 days ahead. Heavy rains permit forecasts 1–2 days ahead. This permits regulation of flow of Rhine. *Subject Heading:* **1. Hydrologic forecasting 2. Lake Constance, Germany.**—*C.E.P.B.*

4.10–82 551.509.5:632.9:633.491

Grainger, John, **Potato blight forecasting and its mechanization.** *Nature*, London, 171(4362):1012–1014, June 6, **1953.** 3 figs., 2 refs. **DWB**—Outbreaks of *Phytophthora infestans* occur 15–22 days after minimum temperature above 50°F and minimum relative humidity 75% and forecasts have been issued in Scotland on this basis but more reporting stations are needed. An apparatus is described by which a bi-metallic thermograph (wet- and dry-coils) records temperature and relative humidity by red and green records and gives blight conditions at a glance. *Subject Heading:* **1. Potato blight forecasting.**—*C.E.P.B.*

4.10–83 551.509.5:551.515.23(74/9)

Wolff, Paul M., **A modification of the J. J. George objective forecasting method for cyclones.** (In: U. S. Navy. Fleet Weather Central, **Some recent developments in synoptic meteorology.** Aug. **1952.** Section 3. 4+ p. 2 refs., 4 plates.) **DWB**—Simple rules for forecasting 24-hour movement of Low center are extracted from J. J. GEORGE's papers (*see* Reports No. 2 and 3—Eastern Air Lines) and synoptic examples given for March 3 and 4, 1952. Applies only to continental U. S. A. and is greatly simplified. *Subject Headings:* **1. Objective forecasting 2. Cyclone movement forecasting 3. United States.**—*M.R.*

CLOUD SEEDING AND ARTIFICIAL PRECIPITATION

4.10–84 551.509.67

Dufour, Louis, **Peut-on faire pleuvoir artificiellement?** [Can rain be made artificially?] *Ciel et Terre*, 68(9/10):187–195, Sept./Oct. **1952.** Also in: *Belgium. Institut Royal Météorologique, Publications, Ser. B*, No. 4, **1952. MH-BH**—Semi-popular lecture on recent theories in cloud physics and on cloud seeding experiments conducted in various countries. The possibility of increasing precipitation by cloud seeding is not yet established, because the conditions favoring effective seeding are practically the same as those leading to natural precipitation. "Industrial" practice of rainmaking is therefore a waste of money at this point. All such commercial efforts—the author believes—should be discouraged and funds should rather be made available to cloud physicists who alone are likely to achieve positive results even if success is not yet in view. *Subject Heading:* **1. Artificial precipitation.**—*G.T.*

4.10–85 551.509.67(09)

Loewe, Fritz, **Some forerunners of rainmaking by seeding of clouds.** *Weather*, 8(2):35–37, Feb. **1953.** 11 refs. **MH-BH**—Brief history from L. GATHMANN (1891, liquid CO_2), and A. BERG (1922, liquid air) to W. FINDEINSEN (1938). *Subject Headings:* **1. Cloud seeding 2. History of meteorology.**—*C.E.P.B.*

4.10–86 551.509.67

Water Resources Development Corporation, Denver, Colo., **Analysis of cloud seeding operations for Tri-County Weather Research Inc. Sept. 1950 through June 1951. Final Report.** *Water Resources Development Corporation, Denver, Report*, No. 103, **1952.** 31 p. fig., 5 tables. **DLC**—The contents of this report include: 1) summary of the Weather Bureau's

Crop Bulletin for Sept. 1950–July 30, 1951; 2) a description of the preparation for and conduction of a cloud seeding operation; 3) location of the AgI generators operated for the benefit of the Tri-Counties Association (Oregon and Washington); 4) a statistical study by means of regression equations of the relationship between winter wheat yields in Morrow, Sherman and Gelliam Counties, Oregon, and rainfall; 5) a summary of the precipitation data for the Tri-County Area for the period March 1950–June 1951; and 6) a simple account of the technique of evaluating the effectiveness of cloud seeding. *Subject Headings:* **1. Artificial precipitation 2. Cloud seeding effectiveness 3. Wheat yield 4. Oregon.**—*I.L.D.*

4.10–87 551.509.67

*§Weather Modification Company, Redlands, Calif., **Cloud seeding experiments in Santa Clara County, Dec. 1, 1951 through March 31, 1952.** 59 p. 27 figs., tables. **DWB**—Detailed report on cloud seeding operations by means of ground generators. Rainfall data for target and control areas presented. Statistical tests show 10% increase over naturally expected rain, computed by means of regression formulas. Synoptic analysis given for each storm, based on synoptic charts, tropospheric wind charts and ascent data. (*See* 4.10–88 below.) *Subject Headings:* **1. Cloud seeding 2. Cloud seeding effectiveness 3. Santa Clara County Calif. I. Battle, John A. II. Jones, W. Floyd III. Todd, Clement.**—*A.A.*

4.10–88 551.509.67

*Weather Modification Company, Redlands, Calif., **Report of cloud seeding experiments for the Grand River Valley Weather Improvement Association, Lemmon, South Dakota, May 15–July 31, 1952.** 21 p. tables, diagrs. **DWB**—A serious attempt to test the effectiveness of cloud seeding. From ten years rainfall observations a regression equation was developed to compute the "natural" rainfall in the seeded target area from rainfall measurements in three control areas. The actual rainfall was 23% higher. Probability of chance 1–5. Over seven seasons would be necessary to raise the significance to 1–100. The report gives detailed actual data and computations and shows the operation of silver iodide ground generators according to weather conditions. *Subject Headings:* **1. Cloud seeding effectiveness 2. Grand River Valley. I. Battle, John A. II. Jones, W. Floyd III. Todd, Clement.**—*A.A.*

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

STRUCTURE OF THE ATMOSPHERE

See also: **Atmos. ozone, relation to meteorological conditions** (Langle), 4.10–8; **Sodium in upper atmos.** (Saha), 4.10–11; **New method of ionospheric height measurement** (Rakshit, Catterjee), 4.10–32; **Auroral, meteor and ionospheric back-scatter long duration echoes** (McKinley, Millman), 4.10–33; **Pyrgeometer for upper atmos. ozone layer observations** (Kuwana, Kira), 4.10–59; **Adaptation of cohesion filter tube for ozone analysis in atmos. air** (Jessel), 4.10–67; **Absorption of solar radiation by volcanic dust** (Vittozi), 4.10–136; **Upper wind and Kepler motion** (Quiring), 4.10–181.

4.10–89 551.510.41:546.214

*Renger, F. and Lucke, O., **Über die meteorologischen Bedingungen der Ozondichte in bodennaher Luft.** [On the meteorological conditions of ozone density in air near the ground.] *Germany. Deutsche Demokratische Republik. Meteorologischer Dienst, Abhandlungen,* 2(13), **1953.** 44 p. 29 figs., 39 tables, 49 refs. **DWB**—Two series of microchemical ozone measurements, with accompanying weather, UV radiation and air mass, by H. Cauer, 80 m above Weissbach valley floor (750 m, running SSW) in autumn 1941 and May 1942, are set out and analyzed. A diurnal variation was found in settled weather in May (maximum 22γ/m^3 at 20 h, minimum 15 at 6 h) but not in Oct./Nov. Ozone was high with dry air and with subsidence and föhn, low with moist air and with convection. Fog and drizzle brought an especially rapid decrease. Cyclones and anticyclones, turbulence, squalls and air mass had no systematic effect. High values are associated with thunder. *Subject Heading:* **1. Ozone data.**—*C.E.P.B.*

4.10–90 551.510.42:551.594.14

Eisenbud, Merril and Harley, John H. (*U. S. Atomic Energy Comm., N. Y.*), **Radioactive dust from nuclear detonations.** *Science*, 117(3033):141–147, Feb. 13, **1953.** 3 tables, fig., 3 refs. **DWB**—Results obtained in measuring radioactivity in dust particles dispersed by nuclear explosions are reported. The measurements are being made by a monitoring system set up by the Atomic Energy Commission and comprising 121 monitoring stations located at Weather Bureau stations throughout the U. S., as well as mobile teams operating in the area 200–500 miles from the atomic test site. After discussing the data obtained so far, the authors conclude that "the long-lived components of the radioactivity are of a low order compared with the natural radioactivity of the earth's surface and atmosphere." *Subject Headings:* **1. Radioactive dust 2. Atomic explosions 3. Radioactivity in the atmosphere.**—*G.T.*

4.10–91 551.510.42

Feodoroff, Nicholas V., **Some aspects in the control of air pollution in industrial areas.** *New York Academy of Sciences, Transactions, Ser. II*, 14(8):321–324, June **1952.** table, 3 refs. **DLC**—A discussion of some of the measures of air purification in industrial centers and of the effects of air pollution upon vegetation and upon health and of some of the causes of air pollution. Brief descriptions of the operations of mechanical collectors and electrical precipitation and of their efficiency are given. *Subject Headings:* **1. Atmospheric pollution 2. Atmospheric pollution control.**—*I.L.D.*

4.10–92 551.510.42:551.593.54

Kearns, K. C., **Smoke haze over the Isle of Man.** *Smokeless Air*, 86:164–166, Summer **1953.** fig. **DWB**—With setting in of a SE wind, visibility in Is. of Man drops suddenly from 20 to 2 or 3 mi. This happens either with approach of a depression or establishment of a high over southern North Sea, and is due to stable lapse rate and concentration of smoke-producing areas to S.E. *Subject Headings:* **1. Atmospheric pollution 2. Smoke 3. Visibility 4. Isle of Man.**—*C.E.P.B.*

4.10–93 551.510.42

Morgan, G. A., **Air pollution in South Wales. Towards a remedy.** *Smokeless Air*, 86:161–163, Summer **1953. DWB**—Summary of a lecture. Recommends combined action in introduction of efficient smoke preventing apparatus, use of smokeless fuels. Official organization to secure uniformity of action along South Wales coastline is needed. *Subject Headings:* **1. Smoke abatement 2. South Wales.**—*C.E.P.B.*

4.10–94 551.510.42:616.24

Stocks, Percy, **Air pollution and cancer of the lung.** *Smokeless Air*, 84:60–63, Winter **1952.** 5 refs., photo. **DLC**—Cancer of the lung has been increasing in Britain. Carcinogenic substances are present in smoke, and lung cancer mortality in towns increases regularly with the population. The greatest density of infection is displaced downwind from center of population. Tobacco smoke is an auxiliary cause. *Subject Headings:* **1. Atmospheric pollution effects 2. Lung cancer.**—*C.E.P.B.*

4.10–95 551.510.42:628.53

Wurts, Thomas C., **American industry lends generous support to the Air Pollution Control Association.** *Smokeless Air*, 85:116–118, Spring **1953.** Barash, M., **Smoke abatement and fuel economy in the home.** *Ibid.*, 125–127, 130. **Smoke prevention—problems and prospects.** *Ibid.*, 128–130. **DWB**—1. Brief account of history and activities of the Association since 1907. 2. Description of long-term domestic fuel policy to abolish domestic smoke and save by replacing coal by smokeless fuels or electricity. 3. The need for smoke abatement is admitted but the problem, though grave, is so insiduous that it has low priority, and the program and problems of the Smoke Abatement Societv are discussed. *Subject Headings:* **1. Smoke abatement. I. Barash, M.**—*C.E.P.B.*

UPPER ATMOSPHERE—IONOSPHERE

4.10–96 551.510.53

Regener, Erich, **The stratosphere.** (In: **German aviation medicine, World War II.** Wash., D. C., U. S. Govt. Printing Office, **1950.** v. 1, p. 95–101. fig., 3 tables, 16 refs.) **DWB**—A brief summary of the results of German research on the stratosphere just preceding and during World War II, containing a discussion of the composition of the atmosphere up to altitude of 30 km, evidence for turbulence in the lower stratosphere, the regime of stratospheric temperature, the upper ozone layer and the origin and characteristics of the D, E and F layers. *Subject Heading:* **1. Stratospheric research.**—*I.L.D.*

4.10–97 551.510.53(09)

Schmauss, August, **Die Entdeckung der Stratosphäre im Jahre 1902.** [The discovery of the stratosphere in 1902.] *Meteorologische Rundschau*, 5(9/10):161–163, Sept./Oct. **1952.** 5 figs. **DWB**—In May 1902 Assmann and Teisserenc de Bort both reported discovery of stratosphere; the latter coined terms troposphere and stratosphere. Theories of stratosphere and height of tropopause in different latitudes and pressure systems and tropopause types described. Stratosphere is also marked by a decrease of wind and humidity. *Subject Headings:* **1. Stratosphere 2. History of meteorology 3. Tropopause.**—*C.E.P.B.*

4.10–98 551.510.535

†Al'pert, IA. L., **Sovremennoe sostoianie voprosa ob issledovaniiakh ionosfery.** [Present status of the problem on investigation of the ionosphere.] *Uspekhi Fizicheskikh Nauk*, Moscow, 36(1):1–29, Sept. **1948.** 5 figs., 6 tables, 51 refs., 6 eqs. **DLC**—A long review of theoretical basis for our present (1948) knowledge of the nature and formation of the ionosphere. A great deal of data and theory from recent literature from all parts of the world is organized along the following lines: 1) Formation of ionospheric layers; 2) Basic processes in ionosphere (photoionization, recombination of electrons, recombination of ions, dissociation of electrons from ions); 3) Theory of recombination and its weaknesses; 4) Problems of the F2 layer and difficulties with the theory of photoabsorption of ultraviolet in F2 layer; 5) Effective impact index γ effective for various layers of the ionosphere; 6) Temperature, density and structure of the ionosphere. Models, tabular data and many references are given besides the theory. *Subject Headings:* **1. Ionospheric research 2. Ionospheric structure.**—*M.R.*

4.10–99 551.510.535:550.385

Appleton, V. Edward and Piggott, W. Roy, **Ionospheric storms and the geomagnetic anomaly in the F_2 layer.** *Journal of Atmospheric and Terrestrial Physics*, 3(2):121–123, Feb. **1953.** 2 figs., 4 refs. **DWB**—Curves are given showing diurnal course of ratios of critical F2 frequencies at Wakkanai (45°4'N, 141°7'E) on disturbed/quiet days, and of Ottawa/Wakkanai. It is found that the geomagnetic distortion anomaly causes a minimum of F2 in forenoon and maximum in afternoon, and this anomaly is accentuated by a weak ionospheric storm. *Subject Headings:* **1. Ionospheric storms 2. Magnetic disturbances 3. F2 layer.**—*C.E.P.B.*

4.10–100 551.510.535:551.594.7

Dieminger, Walter, **Über die Ursache der excessiven Absorption in der Ionosphäre an Wintertagen.** [On the causes of excessive absorption in the ionosphere on winter days.] *Journal of Atmospheric and Terrestrial Physics*, 2(6):340–349, **1952.** 9 figs., 23 refs. English summary p. 340. **DWB**—On many winter days echoes are received on 1.6–4 Mc/sec from 75–90 km with a regular diurnal variation of height, minimum at noon, merging with a level of sporadic echoes at 95 km between sunset and sunrise, independent of frequency. The height of the echoes is closely related to short-wave absorption and they are attributed to partial reflection at sharp boundary of an ionized region extending downwards from E-layer. It is possible that sporadic night reflection is due to volcanic dust. *Subject Headings:* **1. Ionospheric reflection 2. Sporadic E layer.**—*C.E.P.B.*

4.10–101 551.510.535

Dieminger, Walter (*Inst. for Ionosphere Investigation, Hanover, Germany*), **Origin of onospheric scattering.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 11:175–194, **1952.** figs., 21 refs. Discussion. **DWB**—Deals with occurrence nd origin of scattering (scattered echoes) as observed at Lindau during 1947 and 1948. Dividing the echo types into: 1) E-scatter, 2) 1F-scatter, 3) 2F-scatter, 4) G-scatter, author iscusses each type in some detail. The 2F type is due to ground irregularities, and is present egularly, the other types only under suitable ionospheric conditions. *Subject Heading:* **Ionospheric scattering.**—*W.N.*

4.10–102 551.510.535:551.594.7

Findley, J. W., **An investigation of sudden radio fadeouts on a frequency near 2 Mc/sec.** *ournal of Atmospheric and Terrestrial Physics*, 1(5/6):367–375, **1951.** 2 figs., 3 tables, 12 efs.. 8 eqs. **DWB**—Observations on 105 fadeouts were made on frequencies near 2 Mc/sec^{-1} o determine the height at which extra ionization is produced during a sudden fadeout. This eight was found less than 101 km with a collision frequency of about 4.10^6 sec^{-1}. *Subject leadings:* **1. Ionospheric research 2. Radio fading.**—*A.A.*

4.10–103 551.510.535:551.594.7

Findlay, J. W., **The phase and group paths of radio waves returned from region E of the onosphere.** *Journal of Atmospheric and Terrestrial Physics*, 1(5/6):353–366, **1951.** 11 figs., tables, 18 refs., 14 eqs. **DWB**—In measuring the daily and seasonal variations of phase aths of radio waves of the frequency 2.4 Mc./sec^{-1} returned from the E layer it is found that he results disagree with those found for Chapman-region. *Subject Headings:* **1. Ionospheric esearch 2. Radio wave propagation 3. E layer.**—*A.A.*

4.10–104 551.510.535

Gerson, N. C. (*Geophysical Res. Dir. Cambr., Mass.*), **Ionospheric research in the U. S. ir Force.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, o. 7:136–142, Dec. **1950. DWB**—A brief review of extensive theoretical and experimental tudies. Especially important are rocket flights. Research on artificial auroras and flying onospheric stations is considered. A theoretical examination of temperatures in the upper tmosphere is made, but different results depending on given model ionosphere are obtained. spectrophotometer for further auroral research is being constructed. The author emhasizes that Arctic research in North America should be intensified. *Subject Headings:* **Ionospheric research 2. U. S. Air Force, Cambridge Research Center.**—*A.A.*

4.10–105 551.510.535

†Gerson, N. C., **Nocturnal ionization in the F_2 ionospheric region.** *Reviews of Modern hysics*, 21(4):606–624, Oct. **1949.** 5 graphs, table, 137 refs., 54 eqs. **DLC**—Author explains octurnal ionization by electron recombination processes. He first summarizes data on tmospheric composition and structure (complete mixing up to 350 km) and variation of emperature and pressure with height by day and night. Rates of insolation, photo-ionization nd photo-dissociation in ionosphere are determined, and possible non-solar bombardment, orizontal and vertical transport of ions, and especially storage of ions may prove effective. ate of recombination is examined quantitatively, assuming a marked fall of temperature at ight at 300 km; predicted and observed electron densities agree passably. *Subject Headings:* **Ionospheric research 2. F2 layer.**—*C.E.P.B.*

4.10–106 551.510.535

Gerson, N. C., **Summary of a meeting on mathematical problems in ionospheric research.** *J. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 7:175–176, ec. 1950. **DWB**—Short discussion on a number of problems, mainly in the fields of the ropagation of short and long radio waves, the magnetoionic theory, and tropospheric influences nd the solar ionosphere. *Subject Headings:* **1. Ionospheric research 2. Radio wave propagaon.**—*A.A.*

4.10–107 551.510.535:06

Gerson, N. C. (*Cambridge Res. Center, Mass.*), **A note on the conference on ionospheric physics.** *U. S. Air Force. Cambridge Research Center, Geophysics Research Papers*, No. 11:13–14, **1952. DWB**—The author, in his introductory remarks to the conference reports, brings out the fact that physicists have neglected many important fields of research such as were represented in this conference (physics of the high atmosphere and study of planetary atmosphere) while concentrating on nuclear and cosmic ray research. The atmosphere is considered as comprising several shells; the ionosphere (80–400 km), the mesosphere (400–1000 km) and the exosphere (above 1000 km). Specific problems which are being solved are: dissociation and recombination processes, correlation of solar and ionospheric phenomena, improvement of spectroscopic methods and microwave observational techniques. *Subject Headings:* **1. Upper atmosphere physics 2. Ionospheric physics conferences.**—*M.R.*

4.10–108 551.510.535:551.594.7

Gibbons, J. J., Schrag, R. L. and Waynyck, A. J., **Long-delay ionospheric echoes at 150 kc./s.** *Nature*, London, 171(4349):444–445, March 7, **1953.** fig., 7 refs. **DWB**—Authors find virtually total reflection from a virtual height of 940 km. Records for Nov. 10, 1952, shown. Possible causes are discussed. *Subject Heading:* **1. Ionospheric reflection.**—*C.E.P.B.*

4.10–109 551.510.535:621.396

Granalingam, S. and Weekes, K., **Weak echoes from the ionosphere with radio waves of frequency 1.42 Mc/s.** *Nature*, London, 170(4316):113–114, July **1952.** ref. **DWB**—By a new technique, reflections were observed from 75–80, 90–95, and 112 km in winter, and 102–105 km since mid-March. *Subject Heading:* **1. Ionospheric reflection.**—*C.E.P.B.*

4.10–110 551.510.535:551.594.6

Hewish, A., **The diffraction of galactic radio waves as a method of investigating the irregular structure of the ionosphere.** *Royal Society of London, Proceedings, Ser. A*, 214(1119): 494–514, Oct. 9, **1952.** 13 figs., tables, 16 refs., 6 eqs. **DWB**—Amplitudes of 1.4–8 m waves from 4 radio stars at 2 points 1 km apart show that variations of phase and amplitude are due to steady drift of an irregular wave pattern, which can be regarded as caused by ionospheric irregularities 2–10 km across with a variation of electron content of about 5×10^9 per cm^2, in a thin layer at a height of about 400 km. They are most pronounced about midnight. The irregular part of the ionosphere has a wind-like motion; the E–W component varies from +500 m/s to −500 m/s. The average is about 300 m/s at 0–1 h decreasing to 150 at 4–5 h. Large speeds are associated with magnetic disturbances. *Subject Headings:* **1. Ionospheric movements 2. Galactic radio noise.**—*C.E.P.B.*

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE

See also: **Numerical method of integrating barotropic vorticity equation** (Fjørtoft), 4.10–71; **Geostrophic poleward flux of angular momentum, Jan. 1949** (Mintz), 4.10–118; **Motion of atmos. vortices** (Syoono), 4.10–125; **Relation of large scale northward moisture flow to tornadoes** (Carstensen), 4.10–184.

4.10–111 551.511:551.557:551.558

Faust, Heinrich, **Änderung der relativen Topographie bei meridionaler Advektion und ein Vergleich zwischen advektiv und konvektiv bedingten Temperaturänderungen.** [Change of relative topography during meridional advection and a comparison between advectively and convectively caused temperature changes.] *Meteorologische Rundschau*, 6(3/4):49–50, March/April **1953.** 4 figs., table, 8 refs. **MH-BH**—Mean values of relative topography 500–1000 mb are plotted for straight NW–NE and SW–SE currents over Europe for Jan. and July. Mean temperatures are compared with those in centers of anticyclones and depressions and it is found that temperature changes due to vertical motion are at least as important as those due to meridional advection but are less striking because spread over longer periods. *Subject Headings:* **1. Advection 2. Vertical motion.**—*C.E.P.B.*

4.10–112 551.511:551.509.317

Faust, Heinrich, **Erfahrungen mit Karten der Verdunstungslabilität (Sommer 1951).** Experiments with charts of evaporation lability (summer 1951).] *Meteorologische Rundschau*, (1/2):20–24, Jan./Feb., **1953.** 3 figs., 7 refs. **DWB**—Daily charts of evaporation lability *ee item* 11–54, Nov. 1950, *MAB*) at 3h were drawn for W. Europe, June–Aug. 1951, using mperature difference 850–500 mb. These are related to showers or thunder in calm, moving r, fronts, air mass, surface pressure, etc. Applications to forecasting are discussed. *Subject eadings:* **1. Dynamics of the atmosphere 2. Instability.**—*C.E.P.B.*

4.10–113 551.511:551.515.11

Hollmann, G., **Beitrag zur Zyklonentheorie.** [Contribution to the theory of cyclones.] *Meteorologische Rundschau*, 6(3/4):41–45, March/April **1953.** fig., 15 refs., 56 eqs. **MH-BH**—he essential dynamic peculiarities of moving cyclones are deduced from the vorticity equation, ving an especially simple solution for the system: deep cyclone between two weak anti-clones. Two limiting conditions giving stability are found: 1) the phase velocity equals the ean surface current; 2) phase shift with height. Between these two the amplitude increases ponentially. The type of field development depends on the distribution of heat sources nd sinks. *Subject Headings:* **1. Cyclone dynamics 2. Vorticity equations.**—*C.E.P.B.*

4.10–114 551.511:551.524.1

Jones, John J. (*Tokyo Weather Central*), **Equivalent potential temperature as measure of mospheric stability.** *U. S. Air Force. 2143D Air Weather Wing, Technical Bulletin*, No. 18–22, Jan. **1952.** 3 figs. **DWB**—Cautions in use of θe charts in synoptic analysis and fore-sting. Examples are given of correct use of these charts to determine "potential stability." *ubject Headings:* **1. Equivalent potential temperatures 2. Stability.**—*M.R.*

4.10–115 551.511:551.513.1

Kuo, Hsiao-Lan (*Mass. Inst. of Tech.*), **Dynamical aspects of the general circulation and e stability of zonal flow.** *Tellus*, 3(4):268–284, Nov. **1951.** 6 figs., refs., 27 eqs. **MH-BH**—uthor discusses the stability of the zonal wind profiles with respect to disturbances by means the linearized vorticity equation. A two-dimensional barotropic model for the upper part the troposphere is adopted in order to represent the general mean motion. Theoretical sults compared with actual wind profile in winter. *Subject Headings:* **1. Atmospheric circula-on 2. Atmospheric disturbances 3. Vorticity equations.**—*A.A.*

4.10–116 551.511

Skeib, Günter, **Modellversuche zur thermischen Konvektion.** [Researches with models to thermal convection.] *Germany. Deutsche Demokratische Republik. Meteorologischer ienst, Abhandlungen*, 3(20), **1953.** 56 p. 23 figs., 16 tables, 19 refs., 36 eqs. **DWB**—onvection was studied in various liquids in a cylindrical bath with a central circular heating ement, using thermoelements for temperature and injections of coloring matter or colored reads for velocity. The results are set out in numerous tables and diagrams and are used calculate the equations of stream flow. The conversion factors for transferring the equa-ons to atmospheric flow are estimated but this transference is not carried through. *Subject eading:* **1. Convection.**—*C.E.P.B.*

GENERAL CIRCULATION

See also: **Application of wave length ideas to forecasting** (Sumner), **4.10–73**; **Dynamical aspects of general circulation and stability of zonal flow** (Kuo), **4.10–115.**

4.10–117 551.513.1:517.514.3

Haurwitz, Bernhard (*New York Univ.*) and Craig, Richard A. (*U. S. Air Force. Cambridge es. Center*), **Atmospheric flow patterns and their representation by spherical-surface harmon-s.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 14, July **52.** 78 p. 14 figs., 9 tables (1 fold.), 9 refs., eqs. **DWB**—Some theoretical and empirical in-

vestigations of large-scale flow patterns in the atmosphere are presented. These investigations are characterized primarily by the use of spherical coordinates. One of the assumptions on which the theoretical investigations are based is that of an undisturbed westerly flow of constant angular velocity. This assumption is tested with 10,000 ft maps and is found to hold reasonably well between the latitudes 30°N and 60°N. Interrelationships between the strength of this flow and other meteorological parameters are studied statistically. The theoretical investigations yield a solution for the stream function (or pressure) in the form of a superposition of spherical harmonics. Consequently, a method of spherical-harmonic analysis is described and applied to several weather maps. These analyses show that: (a) spherical-harmonic analysis affords a powerful method of representing a large amount of data with relatively few numbers and could become a useful tool in climatology or in analogue investigations; (b) the part of the pressure field that is "forced" by the solenoidal field is predicted reasonably well by the theory; (c) the application of the theory in its present form to day-to-day forecasting is hampered considerably by the lack of data from large parts of the earth. Tables are presented to facilitate future applications of spherical-harmonic analysis. *Subject Headings:* **1. Pressure circulation 2. Spherical harmonics.**—*Authors' abstract.*

4.10–118 551.513.1:551.511

Mintz, Yale, **The geostrophic poleward flux of angular momentum in the month of January 1949.** *Tellus*, 3(3):195–200, Aug. **1951.** 6 figs., 2 tables, 5 refs., 4 eqs. **MH-BH**—From sea level, 700, 500, 300 and 200 mb daily synoptic charts over the whole of the Northern Hemisphere and 100 mb charts over three fourths of the hemisphere, the mean geostrophic poleward flux of angular momentum is computed for Jan. 1949. A northward total flux is found in all latitudes, with the maximum at latitude $32\frac{1}{2}$°N of 5.4×10^{16}t m^2 s^{-2}. Four fifths of this flux occurs between the 500 and 100 mb levels. From the meridional convergence of the flux, the mean zonal surface stress is computed. The sign of this derived stress is found to be in good agreement with the distribution of the surface zonal wind: its average magnitudes, in the region of the surface westerlies, is 1.2 dynes cm^{-2}. *Subject Heading:* **1. Angular momentum.**—*Author's abstract.*

4.10–119 551.513.1

Noguchi, K., **Blocking action in the horse latitude.** *Journal of Meteorological Research*, Tokyo, 4(5):202–207, Aug. **1952.** 7 figs. In Japanese, English summary p. (15). **MH-BH**—The mechanism of blocking is analyzed with the help of pressure and temperature data obtained in June–July and Sept.–Oct. 1951. Surface and upper air pressure charts and comparative temperature curves are given. The material presented contains information on the duration of blocking caused by cold or warm air masses, the nature of warm anticyclones, of cut-off highs, etc. The study is based on the assumption that since blocking is a phenomenon in the process of horizontal austausch, "increase of horizontal temperature gradient is due to a warm or cold air mass." *Subject Headings:* **1. Blocking action 2. Air masses.**—*G.T.*

ATMOSPHERIC DISTURBANCES

See also: **Frontal precipitation and lightning observed by radar** (Marshall), 4.10–34; **Modification of J. J. George objective forecasting for cyclones** (Wolff), 4.10–83; **Cyclone theory** (Hollmann), 4.10–113; **Clear air turbulence at 20,000 ft in frontal zone** (Pothecary), 4.10–170; **Relation of large scale northward moisture flow to tornadoes** (Carstensen), 4.10–184; **Watching the sky** (Scorer), 4.10–199; **Relation: rain water chlorinity and air mass** (Tukeuchi, Nakazawa), 4.10–211; **Biometeorological results of Thübingen working party** (Daubert), 4.10–242.

4.10–120 551.515:551.577.37(46)

†Ward, A., **Unusual August weather over southern Spain and Portugal.** *Meteorological Magazine*, London, 82(968):38–41, Feb. **1953.** 3 figs., 2 refs. **MH-BH**—Aug. 27–29, 1952, heavy thundery rains over S. Spain and Portugal are attributed to a deep cold trough near Lisbon, with very moist air above. *Subject Headings:* **1. Excessive rainfall 2. Spain 3. Portugal.**—*C.E.P.B.*

4.10–121 551.515.11

Bodolai, István, **Az advektív-dinamikus analísis alapelvei. V. rész; a ciklonok és anti-klonok keletkezése és fejlődése.** [The fundamentals of advective-dynamic analysis. . V; formation and development of cyclones and anticyclones.] *Időjárás*, 56(5/6):145–155, ay/June **1952.** 7 figs. French summary p. 198. **DWB**—The theory of dynamic advection applied to the formation and development of cyclones. The study is mainly based on nclusions reached by N. L. TABOROVSKIĬ and other Soviet scientists. The formation of clones and anticyclones on a stationary front is attributed to uneven horizontal temperature d pressure gradients causing dynamic pressure changes. The evolution of such cyclones d anticyclones is analyzed through several stages of their development and illustrated by hematic diagrams. Rules for the prediction of strengthening or dissolution of cyclones or ticyclones and for the anticipation of their path are given. *Subject Headings:* **1. Anti-clogenesis 2. Cyclogenesis.**—*G.T.*

4.10–122 551.515.11:37

Botley, F. V., **A cyclone model.** *Weather*, 8(1):16–17, Jan. **1953.** 2 figs. **MH-BH**—escription of a three dimensional model of a depression, with frontal surfaces, air masses and ouds, for teaching elementary meteorology. *Subject Headings:* **1. Teaching of meteorology Cyclone structure 3. Cyclone models.**—*C.E.P.B.*

4.10–123 551.515.11(267.4)

*Das, P. K., **Monsoon depressions in the Bay of Bengal.** *Indian Journal of Meteorology d Geophysics*, 3(3):225–229, July **1952.** 5 figs., 2 tables, 3 refs. **DWB**—The conditions r the formation of a depression at the head of the Bay of Bengal became favorable whenever e flux of angular momentum exceeded -6.10^2 cgs units. SOLBERG's criterion for dynamic stability using the computed vertical component of vorticity was not generally exceeded fore the depression was formed. The computation of convergence gives a general idea on ssible precipitation. *Subject Headings:* **1. Angular momentum flux 2. Vorticity 3. Con-rgence 4. Bay of Bengal, India.**—*A.A.*

4.10–124 551.515.11(54)

§Sen, S. N. and George, C. A. (*Regional Met. Center, Madras*), **An analysis of the Masuli-tam cyclone of October 1949.** *Indian Journal of Meteorology and Geophysics*, 3(4):264–277, ct. **1952.** 10 figs., 8 refs. **DWB**—An extensive synoptic analysis based mainly on surface, 00 and 5000 ft pressure maps and height-time cross sections for selected stations shows the velopment of the severe cyclone between three air masses (Tc, Tm and Em). The inter-tion of Tc and Tm air provided the active upglide surface of the warm front. Comparison ade with a similar cyclone of 1945. *Subject Headings:* **1. Cyclogenesis 2. Cyclone structure Masulipatam, India.**—*A.A.*

4.10–125 551.515.11:551.511

Syōno, S. (*Geophysical Inst., Tokyo Univ.*), **Note on the motion of atmospheric vortices.** *eophysical Magazine*, Tokyo, 23(4):423–428, May **1952.** 3 refs., 36 eqs. **MH-BH**—The eory on motion of atmospheric vortices proposed by the author is based upon the assumptions at Coriolis force and the pressure gradient force do not balance completely. Accordingly e solutions of the equations of motion of atmospheric vortices differ from those of ROSSBY ho assumes a complete balance between Coriolis force and pressure gradient force. The uations of motion of a cyclone vortex in a uniform pressure gradient are derived with the d of the principles of the conservation of kinetic energy and of angular momentum. Also e equations of motion of a cold dome are derived from the author's equations of the motion a vortex slice. *Subject Headings:* **1. Vortexes 2. Pressure gradient force 3. Coriolis force Equations of motion.**—*I.L.D.*

4.10–126 551.515.13(261)

§Rodewald, Martin, **Entwicklung und Bahn des westatlantischen Sturmwirbels von 6. November 1952.** [Development and track of the West Atlantic cyclone of Nov. 6, 1952.] *Wetterlotse*, No. 50:1–14, Jan. **1953.** 6 figs. **DWB**—The cyclone followed an unusual track from 20°N, 50°W on Nov. 2 to W. Greenland Nov. 10, deepening suddenly to 965 mb over Newfoundland on 6th. Deepening is attributed to cold front from a weak low further north; this is explained schematically. *Subject Headings:* **1. Extratropical cyclones 2. Cyclone tracks.**—*C.E.P.B.*

4.10–127 551.515.13(261)

Schütz, Thorwald, **MS. "Ostpreussen" im Sturmtief am 6.11.52 südlich Neufundland.** [MS. "Ostpressen" in a depression on Nov. 6, 1952, south of Newfoundland.] *Wetterlotse*, No. 53:49–60, March **1953.** fig. **DLC**—Continuation of report by M. Rodewald (*Wetterlotse* No. 50). Detailed log of weather and warnings received Nov. 5–7 is given, with comments by Rodewald. *Subject Headings:* **1. Extratropical cyclones. I. Rodewald, M.**—*C.E.P.B.*

4.10–128 551.515.22

Flying through a typhoon. *Boeing Magazine*, Seattle, Wash., 22(11):12–13, Nov. **1952.** illus. **DWB**—Summaries of descriptive accounts by Capt. W. E. Beard and Maj. Chester Koniak (54th Strategic Reconnaissance Squadron, Guam) of their typhoon exploration flights in Sept. 1952. Cloud, draft and turbulence conditions encountered at various stages of the flights are reported. Photographs include a picture of cloud formation in the typhoon. The typhoon explored was "Olive" in the Wake Island region. *Subject Headings:* **1. Airplane weather reconnaisance 2. Typhoon "Olive," 1952.**—*G.T.*

4.10–129 551.515.82(93)

Samuel, D. R., **A record of the micro-structure of a cold front.** *Royal Meteorological Society, Quarterly Journal*, 78(338):616–620, Oct. **1952.** 4 figs., 2 tables, ref. **DWB**—Near Melbourne, Australia, Jan. 16, 1952, during passage of a sharp front only 70 m across, in 8 sec temperature fell 5°C and vapor pressure rose 2 mb. Records of wind speed and inclination, temperature and vapor pressure with rapid response instruments at 30 m are given and discussed and eddy fluxes of heat, vapor and momentum calculated. *Subject Headings:* **1. Cold fronts 2. Melbourne, Australia.**—*C.E.P.B.*

4.10–130 551.515.827:551.576.36

Matthewman, A. G., **On the three dimensional structure of the fronts. Part II. Cloud in relation to warm and quasistationary fronts near Bricham Newton in winter.** *Great Britain. Meteorological Research Committee, M.R.P.*, 747, Aug. 31, **1952.** 12 p. 9 tables, 4 refs. Mimeo. **DWB**—Vertical cross sections were drawn for 49 surface warm fronts or warm occlusions. Frontal cloud development is tabulated in relation to distance of surface front, height and thickness of frontal zone, shear of geostrophic and actual wind, relations between speeds of warm or cold air and of front, and ageostrophic motion of front. A definite relation was found only with forward wind component relative to front (correlation 0.5). *Subject Headings:* **1. Fronts 2. Cloud frequencies.**—*C.E.P.B.*

4.10–131 551.515.83

Matthewman, A. G., **Speed of warm fronts.** *Meteorological Magazine*, London 81(963): 266–272, Sept. **1952.** 3 tables, 5 refs., eqs. **DWB**—Various rules or formulas for estimating speed of a warm front are set out. Linear relations were found between speed u_V of 37 selected fronts and geostrophic component normal to the front, both at the front itself and in the cold air 75 miles ahead (u'_J). The latter gave a correlation of +0.85, the regression equation being $u_V = 0.7\ u'_J + 3$. This is in good agreement with dynamical theory. *Subject Heading:* **1. Warm fronts.**—*C.E.P.B.*

RADIATION AND TEMPERATURE

RADIATION

See also: **Mean precipitable water, Japan** (Arakawa, Tsutsumi), 4.10–1; **Effective surface radiation, continents and oceans** (Kuz'min), 4.10–7; **Bolometer for measuring atmos. radiation** (Guild), 4.10–57; **Variability of mean annual temp.** (Reuter), 4.10–144; **Twilight and airglow** (Geo-Science, Inc.), 4.10–255; **Near infrared spectrum of lightning, 4.10–264.**

4.10–132 551.521.1:551.586:615.835

Scherhag, R., **Betrachtungen zum Strahlungsklima Westdeutschlands.** [Remarks on the diation climate of W. Germany.] *Germany. Deutscher Wetterdienst in der US-Zone, erichte*, No. 42:322–325, **1952.** fig., 3 tables. **DWB**—A discussion of the difference of urnal variations of sunshine duration between List on Sylt and Husum, relations to synoptic nditions, and monthly totals in different districts of Germany. *Subject Headings:* **1. Sunshine Western Germany.**—*C.E.P.B.*

4.10–133 551.521.11:551.586:634.8

*Weger, Nikolaus, **Die Sonnenscheindauer in Geisenheim und ihr Einfluss auf die Weinite.** [Sunshine duration in Geisenheim and its influence on wine quality.] *Germany. eutscher Wetterdienst in der US-Zone, Berichte*, No. 42:190–194, **1952.** 3 figs., 2 tables, 7 refs. **WB**—Monthly tables of hourly and total sunshine, sunless days, etc. 1901–30 are given. orrelation between sunshine duration April–Oct. and wine harvest is 0.694. *Subject Headings:* **Sunshine duration 2. Wine harvest 3. Geisenheim, Germany.**—*C.E.P.B.*

4.10–134 551.521.13

Wegener, K. and Georgi, J., **Prüfung der Solarkonstanten.** [Test of solar constant.] *leteorologische Rundschau*, 6(3/4):64, March/April **1953.** 4 refs. **MH-BH**—Referring to *em* 3.4–147, March 1952, *MAB* by J. Georgi, Wegener criticizes Abbot's methods of easuring solar constant. In his reply Georgi mentions other difficulties. *Subject Heading:* **Solar constant.**—*C.E.P.B.*

4.10–135 551.521.14:551.481

Griesseier, Helmut, **Über den Einfluss der Horizontabschirmung auf die Reflexion des ffusen Tageslichts an einer unbewegten Wasseroberfläche.** [On the influence of limited orizon on the reflection of diffuse daylight from a motionless water surface.] *Beiträge zur eophysik*, 63(2):162–165, **1953.** figs., tables, 8 refs., 10 eqs. German and English summaries 162. **DWB**—Equations of reflection of diffuse daylight from an infinite still water surface re set out and then modified for obstructions of horizon. Albedo is reduced from 5.6% for ee horizon to 2.0 for shade up to 60°. *Subject Heading:* **1. Albedo of lakes.**—*C.E.P.B.*

4.10–136 551.521.14:551.510.42:551.21

Vittozi, Pio (*Naples Univ.*), **L'assorbimento della radiazione solare da parte di uno strato i polveri vulcaniche.** [Absorption of solar radiation by a layer of volcanic dust.] *Geofisica ura e Applicata*, 23:137–144, **1952.** figs., 8 refs., 48 eqs. English summary p. 131. **MH-H**—Derives equations for the propagation of solar rays through a layer of volcanic dust. esults applied to observations made after the Katmai eruption in 1912 show a 44 times higher ust content as computed by Humphreys with a simplified method. Number of granules er cm³ was probably about 150. *Subject Headings:* **1. Volcanic dust 2. Atmospheric abprption 3. Katmai eruption.**—*A.A.*

4.10–137 551.521.16

McDermott, L. H. and Gordon-Smith, G. W., **Daylight illumination recorded at Teddingn.** Building Research Congress, Garston, England, **1951.** p. 156–161. 5 figs., 6 tables. **B-MO**—Photoelectric measurements of daylight illumination were made July 1933–Oct. 939 from N, S, E and W octants and whole sky. Hourly means, standard deviations and nges are given in lumens/sq ft for each month; whole sky means are shown in isoline diagram

for 100, 250 and 500 lumens. *Subject Headings:* **1. Daylight illumination 2. Teddington England.**—*C.E.P.B.*

4.10–138 551.521.1

†Scheer, Georg, **Über Messungen der Globalbeleuchtungsstärke und der Zenitleucht dichte während der Dämmerung.** [On measurements of strength of global illumination an zenith light intensity during twilight.] *Meteorologische Rundschau*, 5(11/12):201–206, Nov. Dec. **1952.** 2 figs., 5 tables, 27 refs. **DWB**—Illumination was measured with a Bechstei photometer. Tables and graphs show global illumination lux on a flat horizontal surface fo sun height +2 to −10° with different cloud amounts, and zenith intensity for sun height +5 t −10° with no cloud at zenith in % of that at 0°. Numerous measurements in other countrie are compared. Influence on bird song is discussed. *Subject Headings:* **1. Daylight illumina tion.**—*C.E.P.B.*

4.10–139 551.521.

*Fukui, E. (*Geogr. Inst., Tokyo Univ. of Education*), **Transmission ratio, a climatologica expression of solar penetration through the atmosphere.** *Geophysical Magazine*, Tokyo 23(4):429–436, May **1952.** 3 figs., 3 tables, 3 refs. **MH-BH**—A new index of "transmissio ratio" defined as "the actual total amount of solar radiation falling upon the earth's surfac divided by the total amount entering the earth's atmosphere during any given period" i proposed to replace the generally used transmission through the unit distance of atmosphere Expressions for calculating these ratios are derived. Monthly values of amount of total in solation (cal/cm) upon the upper surface of the atmosphere for latitudes 31° to 50° N are give in a table. Monthly values of the transmission rate for various localities in Japan are give and their geographical distribution is analyzed. The transmission ratio is correlated wit monthly mean cloudiness. *Subject Headings:* **1. Solar radiation 2. Transmission ratio.**— *I.L.D.*

4.10–140 551.521.

*Kaplan, Lewis D., **Regions of validity of various absorption-coefficient approximation** *Journal of Meteorology*, 10(2):100–104, April **1953.** 2 figs., 2 tables, 21 refs., 24 eqs. **MH-BH** —Elsasser's 1938 integral for fractional absorption of radiation by a periodic line pattern i calculated in terms of $y = Su/D \sinh \beta$ (S = total line intensity, D = distance apart of lines) an $\beta = 2\pi\gamma/D$ (γ = half-width). "It is found that composite absorption curves, obtained b ignoring overlapping for small optical paths and ignoring the pressure-dependent term . . for the absorption coefficient for large optical paths, may be applicable to calculation of radia tive heat transfer." The square-root law $A = 2(S\gamma u)^{\frac{1}{2}}/D$ is not theoretically valid; it give results not differing appreciably from the periodic line pattern and offers no advantages ove the latter. *Subject Heading:* **1. Atmospheric absorption.**—*C.E.P.B.*

4.10–141 551.521.3:535.

Plass, Gilbert N. and Fivel, Daniel I. (*Dept. of Physics, Johns Hopkins Univ.*), **Influenc of Doppler effect and damping on line-absorption coefficient and atmospheric radiation transfe** *Astrophysical Journal*, 117(1):225–234, Jan. **1953.** 36 eqs. **DWB**—The general term given for the Taylor series and asymptotic expansions of the line-absorption coefficient whe both the Doppler effect and damping contribute to the line shape. The influence of th Doppler effect on the fractional absorption of a line as measured in the laboratory is calculate and compared with the usual expressions which assume a Lorentz line shape. The radiatio transfer in a planetary atmosphere is calculated when both the Doppler effect and dampin contribute to the line shape and when the change of half-width with height is taken int account. It is shown that for the earth's atmosphere the radiative transfer calculated fro the Lorentz shape alone is not changed appreciably by the Doppler effect for either weak o strong lines at heights up to at least 50 km, even at altitudes where the Doppler width is som what greater than the Lorentz width. *Subject Headings:* **1. Atmospheric absorption 2. Dop pler effect.**—*Authors' abstract.*

4.10–142 551.521.32:546.264

*Adel, Arthur, **Absorption line width in the infrared spectrum of atmospheric carbon dioxide.** Arizona. State College, Contract AF 19(122)-198, Scientific Report No. HA-4, Nov. 1, 1952. 17 p., 7 figs., 2 tables, ref., eqs. Also in: *Physical Review*, 90(6):1024–1025, June 15, 1953. **DWB**—The technique of oblique incidence provides the narrow slits necessary in the direct observation of line width. Correction for the finite width of slit is provided by the theory of slit influence. The average absorption coefficient half-width at half-height for the rotation-vibration lines in the 15 micron band of atmospheric carbon dioxide is 0.12 cm^{-1}. *Subject Headings:* **1. Carbon dioxide 2. Long wave absorption. I. Arizona. State College, Flagstaff II. Contract AF 19(122)-198.**—*Author's abstract.*

AIR TEMPERATURES

See also: **Temp. extremes, U. S.** (Court), 4.10–2; **Breakdown of a low-level inversion** (Gifford), 4.10–51; **Equivalent potential temp. as measure of atmos. stability** (Jones), 4.10–114; **Vertical temp. distribution in sea fog** (Izawa), 4.10–193; **Microclimatology of air layer near ice** (Hoinkes), 4.10–235.

4.10–143 551.524.3(7)

*Summer, Alfred R., **Standard deviation of mean monthly temperatures in Anglo-America.** *Geographical Review*, 43(1):50–59, Jan. **1953.** 14 figs., table. **DLC**—On the basis of temperature records from more than 140 stations in the U. S., Alaska and Canada the standard deviations of the mean monthly temperatures were computed for every month. These were plotted on maps of North America on the Lambert azimuthal equal-area projection on a scale of 1:18,000,000. The highest values of sigma occur during the winter months of Jan. and Dec. of the Northern Hemisphere. The parts of the continent with the lowest mean temperatures in winter have low regime values. Higher values of sigma are associated with a borderline condition of air-mass predominance and the highest sigma values are associated with the föhn or chinook effect. *Subject Headings:* **1. Temperature distribution 2. North America.**—*I.L.D.*

4.10–144 551.524.32:551.521

*Reuter, H., **Theoretische Betrachtungen über die Veränderlichkeit von Jahresmitteltemperaturen.** [Theoretical considerations on the variability of mean annual temperatures.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 4(4):459–469, **1953.** fig., table, 10 refs., 20 eqs. German, English, French summaries p. 459–460. **DWB**—Mean annual temperature variation at any place, in the absence of advection, depends on solar climate. In this theoretical paper, formulas are derived and discussed for mean annual temperature and annual variation at the junction between air and (1) soil impervious to radiation; (2) a water surface. It is concluded that the mean temperature lapse in the atmosphere, being less than the dry adiabatic, introduces aperiodic variations into the mean surface temperature, and that a variation of water surface temperature of the order 1°C is introduced by variations of coefficient of heat transmission of the water. *Subject Headings:* **1. Annual temperature variations 2. Radiation balance.**—*C.E.P.B.*

4.10–145 551.524.33

*Karapiperis, Photios P., **Interhourly variability of temperature at Blue Hill, Massachusetts, U. S. A.** (In his: **Scientific papers, 1950–1951.** 8 p. tables, refs.) Manuscript. **MH-BH**—Analysis and interpretation of hourly temperature records from Blue Hill Observatory for period 1940–1944. Results are compared with CONRAD's (1943) study based on similar observations at Mt. Washington. Detailed tables give annual and seasonal frequencies of inter-hourly variations of various magnitudes at various times of the day, and the average number of drops and rises, etc., together with statistical tests of significance. *Subject Headings:* **1. Interhourly temperature variations 2. Temperature variations 3. Blue Hill Observatory, Mass.**—*M.R.*

4.10–146 551.524.35(262, 495)

*§Karapiperis, Leonidas N., **On the spells of cold weather over the East Mediterranean during the autumn.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 4(4):420-

430, **1953.** 5 figs., 2 tables, 4 refs. English, German, French summaries p. 420. **DWB**—Spells in 1901–40 of 3 or more days each with mean temperature below average showed maximum frequency in late Sept. mid-Oct. and late Nov. All were due to anticyclones, mostly cold, moving E over British Isles, Scandinavia and NNW Europe. Tracks of anticyclones are shown and analyzed; weather charts given for selected examples. Cold spells of Nov. 1915 and 1948 are described in detail. *Subject Headings:* **1. Temperature variations 2. Greece 3. Mediterranean.**—*C.E.P.B.*

4.10–147 551.524.36(73)

Karapiperis, Photios P., **The structure of the weather at Blue Hill as indicated by the hours at which the diurnal extremes of temperature occur.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B,* 4(3):275–276, **1953.** Also in his: **Scientific papers, 1950–1951 MH-BH**—Frequencies of occurrence of daily temperature maxima and minima are tabulated by 2 hr intervals for each season. Secondary peaks of frequencies of both maxima and minima at 0–2 and 22–24 h are attributed to steadily rising or falling temperature due to advection of cold or, less frequently, warm air. *Subject Headings:* **1. Temperature extremes 2. Blue Hill Observatory, Mass.**—*C.E.P.B.*

4.10–148 551.524.37:551.578.46:69

*Guminski, Romuald, **Meteorologia na usługakh budownistwa zimowego.** [Meteorology as applied to architecture in winter.] *Przegląd Meteorologiczny i Hydrologiczny,* Warsaw No. 1/2:108–115, **1952.** fig., table, 3 refs., eq. **MH-BH**—Review of climatic conditions in Poland important for construction during the winter season. The author considers that the most important are air temperature, snow cover and frost penetration into soil. For numerous points of Poland the mean annual number of days with frost (when minimum was below freezing point) and ice days (when the maximum temperature of air was below the freezing point) are given. The empirical equation for computation of depth of frost penetration into soil published by DEBSKI in 1939 and significance of variable values for different points in Poland are included in this review. The equation presented by DEBSKI is $Z=(126-0.9S)GWT$ where Z=depth of frost penetration into soil in cm., S=depth of snow cover, G=variable values depending on soil type, W-variable values depending on location of observation point, T=sums of daily temperatures below 0°C. *Subject Headings:* **1. Applied meteorology 2. Frost 3. Snow cover effects 4. Building construction 5. Poland.**—*N.T.Z.*

4.10–149 551.524.4:551.524.2

Floyd, P. M., **Horizontal and vertical temperature gradients in the air layer near the ground.** *Johns Hopkins University. Laboratory of Climatology, Seabrook, N. J., Interim Report* 15:4–10, Sept. **1951.** 4 figs., table, 3 refs., eqs. **DWB**—Description of the instrumentation and typical profiles are given. *Subject Headings:* **1. Temperature profiles 2. Vertical temperature gradient 3. Temperature distribution 4. Micrometeorology.**—*A.A.*

4.10–150 551.524.4

*Miloslvaljevic, Marko, **Odnos između minimalne temperature na 2 metra i na 5 cm iznad zemlje u Beogradu.** [Relation between minimum temperature at 2 m and at 5 cm above the ground at Belgrade.] *Srpsko Geografsko Druchstvo, Belgrade, Glasnik,* 30(1):11–25, **1950.** 2 figs., 10 tables, 4 refs. In Serbian, French summary p. 24–25. **DLC**—In addition to sheltered temperature at 2 m above the ground, temperatures at 5 cm and on the grass have been recorded at Belgrade since 1944. The 3 temperatures (T_0, t_1 and t) and the differences (Δt_1 Δt_2 and Δt_3 between these values are tabulated in detail and plotted to show the various relationships and the influence of cloud amount (0 to 10 cover) at various hours of the night, for the 12 months of the year. Of course temperature (t) and temperature difference 5 cm to 2 m (Δt_1) show an inverse relationship to cloud amount. Thermometers are illustrated and conditions of observation and computation clearly indicated in text. *Subject Headings:* **1. Temperature gradient near the ground 2. Cloudiness effects 3. Minimum temperatures 4. Belgrade, Yugoslavia**—*M.R.*

4.10–151 551.524.4

Molga, Marian, **Różnice najnizszych dovowych temperature powietrza na wysikości 2 m raz 5 cm nad powierzchnią ziemi.** [Differences between lowest diurnal air temperatures at eights of 2 m and 5 cm above the ground.] *Przegląd Meteorologiczny i Gydrologiczny*, No. /2:107, **1952.** 2 figs., 8 refs. English summary p. 106–107. **MH-BH**—The study is based n special observations carried out at 20 stations during a period of 4–5 years. Relation etween weather conditions, cloudiness and temperature distribution during the nighttime vestigated. It was found that inversion in the 7 m air stratum occurred in 78% of the cases uring cloudy and windy weather, and in 96% of the cases in clear and calm weather. *Subject leadings:* **1. Temperature inversions 2. Temperature gradient near the ground 3. Poland.** *-N.T.Z.*

4.10–152 551.524.4:551.584.3

Nestle, R., **Kleinklimatische Temperaturmessungen im Donauried bei Langenau.** [Microclimatic temperature observations in the Danube marsh near Langenau.] *Germany. Deutscher Wetterdienst in der US-Zone, Berichte*, No. 42:269–273, **1952.** 8 figs., 2 tables, 3 refs. **DWB**—Observations of minimum temperature were made at heights of 0–300 cm on nights f radiation, fog and rain. The results are shown as vertical profiles. *Subject Headings:* **Temperature gradient near the ground 2. Temperature inversions 3. Langenau, Germany.**—*C.E.P.B.*

4.10–153 551.524.4:551.575.1

Saxena, S. P. (*Dept. of Physics, Govt. College, Ajmer*), **Studies in heat transfer.** *Science nd Culture*, Calcutta, 18(1):18–22, July **1952.** 9 refs. **DWB**—In this review of recent studies n heat transfer the author mainly deals with wind tunnel experiments conducted and reported y A. O. Rankine (*Proc. Phy. Soc.* p. 417, 1950). The experiments were aimed at determining ossibilities of dissipating fog over air fields by burning liquid fuel. The author also briefly nentions recent advances in upper air temperature measurement. *Subject Headings:* **1. Heat ransfer 2. Fog dissipation 3. Wind tunnel experiments.**—*G.T.*

4.10–154 551.524.4:551.554:551.575 551.588.6

Temperature Observation Party: On the meteorological situation around fog proof forest. *ournal of Meteorological Research*, Tokyo, v. 4, Suppl. Number, p. 61–70, March **1952.** 11 gs., table. In Japanese, English summary p. 324–325. **MH-BH**—Hourly records of temerature, humidity, wind velocity, etc. were made at 6 forest-edge stations, with fog and no fog. esults are shown in graphs, isolines of temperature, wind speed profiles and stability indexes, nd relations between wind speed and temperature lapse rate are discussed. *Subject Headings:* **Vertical temperature gradient 2. Wind profiles 3. Fog 4. Forest influences 5. Japan.**—*.E.P.B.*

4.10–155 551.524.7:551.509.54(54)

Rao, V. V. (*Indian Air Force, Met. Branch*), **A short note on the use of upper air temerature for forecasting winter rainfall in the Punjab.** *Indian Journal of Meteorology and eophysics*, 3(2):153–157, April **1952.** 6 figs., 2 tables. **MH-BH**—It is shown how to recgnize the formation of secondary depression in the Indian region by means of tephigrams ased on radiosonde ascents. *Subject Headings:* **1. Rainfall forecasting 2. Tephigrams . Upper air temperatures 4. Punjab, India.**—*A.A.*

SOIL TEMPERATURES

4.10–156 551.525.4:551.509.62

Ehrenberg, Wolfgang W., **Künstliche Geländefärbung als Beispiel für "physikalische Katalyse."** [Artificial surface coloration as an example of "physical catalysis."] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 4(4):470–482, **1953.** 4 tables, 9 refs., eqs. German, English, French summaries p. 470–471. **DWB**—A "physical catalyst" is omething which, itself unchanged, alters properties of a body, especially transformation of adiation into heat and *vice versa*. Example: with solar elevation 53°, atmospheric transmis-

sion 75%, calculated temperature, white surface 70°C, black 95°C. Lag, heat conduction evaporation, melting of ice are also considered. Results are compared with white or black dust. Drying of soil is discussed. Methods of applying dust, life of cover and work involved are considered and practical applications in streets and agriculture listed. *Subject Headings:* **1. Artificial soil surface coloration 2. Color influences on temperature 3. Soil temperatures** —*C.E.P.B.*

4.10–157 551.525.6:551.311.2

Fisher, Joel E., **The cold ice tunnel on the Silbersattel, Monte Rosa. Preliminary report** *Journal of Glaciology*, 2(13):195–196, April **1953.** 6 figs., table. **GB-MO**—In summer 1952 temperatures in ice on side of a horizontal tunnel decreased from 16°F 10 m from opening to 11 at 50 m and 8 at 60 m. There was a sudden drop at a 10 cm vertical crack at 55 m. *Subject Headings:* **1. Ice temperatures 2. Glaciers 3. Monte Rosa, Italy.**—*C.E.P.B.*

WATER TEMPERATURES

4.10–158 551.526

Kolesnikov, A. G., **O nagrevanii i okhlazhdenii vody v orositel'nykh kanalakh.** [The warming up and cooling of water in irrigation canals.] *Akademiia Nauk, SSSR, Doklady* 84(3):479–482, May 21, **1952.** 14 eqs. **DLC**—The waters in irrigation canals continuously gain and lose heat with length and time; during the spring they increasingly gain heat and during autumn they lose heat as they approach the points of distribution. On the basis of a theoretical model of a canal of unit dimensions and unit velocity, the author develops equations for calculating the heat gain and heat loss of the water. *Subject Headings:* **1. Water temperature profiles 2. Heat balance 3. Irrigation canals.**—*I.L.D.*

4.10–159 551.526.6:551.465(264)

Currie, Ronald, **Upwelling in the Benguela Current.** *Nature*, London, 171(4351):497–500 March 21, **1953.** 3 figs., 9 refs. **DWB**—The coastal currents off SW Africa are very irregular and increasingly cold as shore is approached; this is illustrated by surface temperature charts. The salinity increases with temperature. Effect of wind is discussed and a vertical section constructed normal to coast. Effect on plankton described. *Subject Headings:* **1. Sea temperatures 2. Ocean currents 3. Benguela Current.**—*C.E.P.B.*

PRESSURE AND WIND

PRESSURE

See also: **Barograph antics** (Crawford), 4.10–161; **Geostrophic wind** (Kiveliovitch), 4.10–182.

4.10–160 551.54:551.501.42:551.509.21(431/5)

Germany. Reichsamt für Wetterdienst, **Prüfbericht betreffend Luftdruckwerte der synoptischen Hauptmeldestellen.** [Testing results of the air pressure values for the main synoptic information stations.] Berlin, March **1944.** 23+8+4 p. 16 charts, tables, eqs. Mimeo. **DWB**—The German Weather Service has much trouble with synoptic air pressure data due to instrumental, reduction, and transcription errors. The mean pressure distribution map for one single month shows a quite random picture, which made it possible to verify a number of doubtful stations (about 30%). An error survey gave fairly satisfactory results. *Subject Headings:* **1. Barometer reduction errors 2. Synoptic chart accuracy 3. Germany.**—*A.A.*

4.10–161 551.541:551.515.41

Crawford, Stanley G., **Barograph antics.** *Weather*, 8(6):192, June **1953. MH-BH**—Referring to previous correspondence, rapid barometric movements in N. Germany on Aug. 14, 1952, in thundery weather, are described and attributed to the rapid propagation to ENE of an asymmetric pressure wave at 600 mb. *Subject Headings:* **1. Microbarometric observations 2. Thunderstorm structure.**—*C.E.P.B.*

4.10–162 551.541:551.577.1

Noth, H., **Luftdruckänderung durch Niederschlag.** [Pressure change by precipitation.] *Meteorologische Rundschau*, 6(3/4):59–62, March/April **1953.** 8 figs., table, 23 refs. **MH-BH**—The release of heat of condensation of often more than 20 kg water per m² causes a rapid fall of pressure, partly offset by weight of water. The chimney effect then draws in surface air from outside and this current causes a much greater rise. The combined effects produce complex microbaric changes, the elements of which are isolated and shown graphically and by model. *Subject Headings:* **1. Microbarometric oscillations 2. Instability showers.**—*C.E.P.B.*

4.10–163 551.542(4262)

Baum, Werner A. and Smith, Lawrence B., **Semi-monthly mean sea-level pressure maps for the Mediterranean area.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 6(3):326–345, **1953.** 25 figs., 6 refs. English, German, French summaries p. 326. **DWB.** Also: Florida. State University. Dept. of Meteorology, Contract AF 19(122)-466, Scientific Report No. 2, July 15, **1952. DWB**—Isobars are drawn for 1 mb intervals over North Africa, Mediterranean, Europe and E. Atlantic to 60°N, for mean 13 h pressure, Jan. 1899–June 1939, also for Oct. as a whole. The seasonal features are discussed. *Subject Headings:* **1. Pressure distribution 2. Europe 3. Mediterranean Sea. I. Florida. State University. Dept. of Meteorology II. Contract AF 19(122)-466.**—*C.E.P.B.*

4.10–164 551.542:551.311.4

Schumann, T. E. W. and Van Rooy, M. P., **Continentality and the analysis of atmospheric pressure over the Northern Hemisphere.** *South Africa. Weather Bureau, W.B.* 15, **1950.** 10 p. 10 plates. In English and Africaans. **DWB**—Continentality is defined on a numerical scale from 0 in mid-Pacific to 900 in Central Siberia. It is given by the amount of land in concentric circles about a point. Pressure can be represented by equation involving continentality, a latitude factor, and coefficients of annual variation. Authors think it could be used to determine pressure distributions in geological periods. *Subject Headings:* **1. Atmospheric pressure 2. Northern Hemisphere.**—*C.E.P.B.*

4.10–165 551.543.1:551.553.12

Bouët, Max, **La variation diurne de la pression dans la Vallée du Rhône suisse.** [Diurnal pressure variation in the Swiss Rhone Valley.] *Journal Scientifique de la Météorologie*, (14):41–46, April/June, **1952.** 3 refs. English and Spanish summaries p. 41. **DWB**—Diurnal and semidiurnal pressure and temperature waves studied by means of harmonic analysis for the Rhone Valley (Sion) and above the Swiss plateau (Lausanne) in order to study the valley breeze. Fair weather barograms selected and computed results presented. Pressure amplitude at Sion about twice as great as in Lausanne. *Subject Headings:* **1. Diurnal pressure variations 2. Diurnal temperature variations 3. Mountain and valley breezes 4. Sion, Switzerland 5. Lausanne, Switzerland.**—*A.A.*

4.10–166 551.543.1

Spar, Jerome (*N. Y. Univ. Dept. of Met. and Oceanography*), **Characteristics of the semidiurnal pressure wave in the United States.** *American Meteorological Society, Bulletin*, 33(10):438–441, Dec. **1952.** 6 figs., 4 refs. **MH-BH**—Using the average hourly station pressures for the period 1931–1940 published by the U. S. Weather Bureau, the author obtained a detailed picture of the geographical and seasonal variation of the amplitudes and phases of the semidiurnal pressure wave in the United States. The mean annual variations of amplitude and phase are shown on maps and the seasonal variations are illustrated graphically. Amplitude is chiefly a function of latitude; it varies slightly with longitude and shows two equatorial maxima and two solsticial minima. Phase does not manifest any systematic dependence upon latitude and with the exception of latitudes 40°–50°N, for which the maximum occurs in July, all latitudes show latest phase in June and earliest phase in Jan. *Subject Headings:* **1. Semidiurnal pressure waves 2. United States.**—*I.L.D.*

WINDS

See also: **Meteorological situation around fog proof forests,** 4.10–154; **Gustiness and föhn, Alpine foothill station** (Schlegel), 4.10–171; **Microclimatology of air layer near ground** (Hoinkes), 4.10–235.

4.10–167 551.55:551.501.

James, R. W., **Ageostrophic mean flow.** *Meteorological Magazine*, London, 81(966):378–379, Dec. **1952.** 3 refs. **MH-BH**—Referring to note by A. F. CROSSLEY (*see item* 4.5–147 May 1953, *MAB*) author discusses vector wind variance as a measure of the activity of migrating disturbances in a given area and suggests $|Vm|/\sigma$ as an index of the general flow. *Subject Heading:* **1. Wind computation.**—*C.E.P.B.*

4.10–168 551.551:551.553.1

Aichele, H., **Kaltluftpulsationen.** [Cold air pulsations.] *Meteorologische Rundschau* 6(3/4):53–54, March/April **1953.** 2 figs., 5 refs. **MH-BH**—On Oct. 10, 1952 in a smoke screen trial at 3h in a small side valley near Bodensee, the smoke flowed alternately down and up the valley for period of 12–23 min. Attributed to accumulation of cold air drops which flowed down the valley, followed by a "suction effect." *Subject Headings:* **1. Wind structure 2. Valley winds.**—*C.E.P.B.*

4.10–169 551.551 533.607(02

*†Pankhurst, R. C. and Holder, D. W., **Wind-tunnel technique: an account of experimental method in low- and high-speed wind tunnels.** London, Pitman & Sons, **1952.** 702 p. 37 figs., 50 tables, 581 refs., 94 eqs. **DLC**—A systematic summary of much scattered literature. Following an introduction on relative motion, dynamic similarity, etc. chapters deal with wind tunnel design, methods of visualizing fluid motion and of measuring fluid velocity (including hot wire anemometers) with tunnel balances, aerodynamic forces from measurements of pressure distribution, manometers, tunnel interference effects (including humidity effects and condensation), reduction of observations, special measurements (including boundary layer and turbulence), experimental analogies and notes on models and rigging. Valuable appendixes give aerodynamic functions, constants, etc. Although mainly of use to aircraft designers, this book includes a great deal of material of meteorological interest. *Subject Headings:* **1. Turbulent flow 2. Wind tunnels 3. Textbooks.**—*C.E.P.B.*

4.10–170 551.551:551.557:551.515.

Pothecary, I. J. W., **Clear-air turbulence at 20,000 ft. in a frontal zone.** *Meteorological Magazine*, London, 82(972):175–178, June **1953.** 2 figs., 3 refs. **MH-BH**—Moderate to severe turbulence was met over Southampton Water for 2 min at 165 m.p.h., Oct. 22, 1952. Probably due mainly to vertical shear of 50 kt in 5000 ft; Ri 1.59. Upper air ascent and cross section shown. *Subject Headings:* **1. High level turbulence 2. Frontal structure.**—*C.E.P.B.*

4.10–171 551.551:551.555.

*Schlegel, Max, **Die Böigkeit der Winde an einer Alpenvorlandstation unter Berücksichtigung des Föhns.** [Gustiness at an Alpine foothill station with special consideration of föhn.] *Germany. Deutscher Wetterdienst in der US-Zone, Berichte*, No. 42:47–50, 1952. 3 figs., 2 tables, 8 refs. **DWB**—A gustiness (maximum speed/mean speed) wind rose for Prien Stock, Bavaria, shows great gustiness of winds SE–SSW, which is attributed to the effect of wooded hill on the föhn. A typical autographic record (temperature, humidity, wind) is reproduced. *Subject Headings:* **1. Gustiness 2. Föhn winds 3. Topographic effect 4. Prien-Stock, Bavaria, Germany.**—*C.E.P.B.*

4.10–172 551.551:629.1

*Taylor, J., **Measurement of gust loads in aircraft.** *Royal Aeronautical Society, London Journal*, 57(506):78–88, Feb. **1953.** 22 figs., 3 tables. **DWB**—Accelerations and strains in gust at points on a wing are discussed. Design of a counting accelerometer is described and illustrated. Specimen records are reproduced and gust spectrum and frequency at different heights are shown in diagrams. Fatigue damage per million miles is compared with gust velocity. *Subject Headings:* **1. Gustiness 2. Aircraft damage.**—*C.E.P.B.*

SPECIAL WINDS

See also: **Diurnal pressure variation, Swiss Rhone Valley** (Bouët), 4.10–165; **Cold air pulsations** (Aichele), 4.10–168; **Diurnal relative humidity variations on sea breeze days, Athens** (Karapiperis), 4.10–187.

4.10–173 551.553.11

*Koch, Horst-Günther (*Jena Univ., Germany*), **Über den Seewind von Rom.** [The sea breeze of Rome.] *Geofisica Pura e Applicata*, 23:185–211, **1952.** 12 figs., 11 tables, 4 refs. English and Italian summary p. 185–186. **MH-BH**—Study based on all available German and Italian wind observations (up to 1400 m) made in the period 1930–44. Author gives cross sections and height-time sections, average values of wind speed for different periods, analyzes single characteristic cases, shows the annual variation of the upper limit of the sea breeze circulation and its extent to the inland (20 km in winter, 60 km in summer) and devotes short discussion to the nocturnal land wind. *Subject Headings:* **1. Land and sea breezes 2. Rome, Italy.**—*A.A.*

4.10–174 551.553.12(436)

*Ekhart, E., **Über den täglichen Gang des Windes im Gebirge.** [On the daily variation of the wind in the mountains.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 3(4):431–450, **1953.** 9 figs., 10 refs. German, English, French summaries p. 431–432. **DWB**—Mountain and valley winds at Salzburg, which dominate the diurnal variation even in föhn, are analyzed from hourly observations March 1949 through Aug. 1951. Plots show seasonal wind roses, isolines of frequency of calms (up to 40%), diurnal variation of scalar velocity (with harmonic dials) and wind vectors, and frequency of up- and down-valley winds. Annual variations of mean temperature and relative humidity of winds from different directions at 7, 14 and 21 h are also plotted. *Subject Headings:* **1. Mountain and valley winds 2. Salzburg, Austria.**—*C.E.P.B.*

4.10–175 551.553.8:551.509.52(54)

*§Sinha, K. L. (*Regional Met. Centre, New Delhi*), **Strong winds at Allahabad and their forewarnings.** *Indian Journal of Meteorology and Geophysics*, 3(2):101–114, April **1952.** 11 figs., 2 tables. **MH-BH**—Study made for the Bamrauli Aerodrome at Allahabad, located at 25°27′N, 81°44′E. Number of days with strong winds (≥20 mph) given for 1941–45. Direction mostly NW (E in July and Aug.). Strong winds classified and local indications for the issue of short-time warning for squally winds discussed. Dust- and thunderstorms with squalls mainly during the monsoon period. *Subject Headings:* **1. Gales 2. Squalls 3. Local forecasting 4. Allahabad, India.**—*A.A.*

WIND EFFECTS

4.10–176 551.556:532.593

Brown, P. R., **Wave data for the eastern North Atlantic.** *Marine Observer*, 23(160):94–98, April **1953.** 5 figs., 3 refs. **DWB**—Graphs show relation of mean wave height to wind speed in knots at Weather Ships I and J, and effect of temperature difference sea minus air on wave height (the larger the difference the greater the height), and relation between wave period in seconds and wind speed (increase from 6 sec. below 10 knots to 10 sec. at 60 knots). Results are briefly discussed. *Subject Headings:* **1. Wind waves 2. Eastern North Atlantic.**—*C.E.P.B.*

4.10–177 551.556:551.461.2

Hahn, Arthur (*Bielefeld*), **Die nichtperiodischen Schwankungen der Tidescheitel bei Wilhemshaven im hydrologischen Jahre 1940.** [Nonperiodical variations of high and low tide water at Wilhemshaven during the hydrologic year 1940.] *Deutsches Gewässerkundliches Jahrbuch, Besondere Mitteilungen*, No. 4:41–55, **1952.** 3 figs., 6 tables, 5 refs. **DWB**—Predictions of the high and low tide water levels are published every year. The author discusses the deviations from predicted heights, caused chiefly by wind direction, speed and air pressure, from a statistical viewpoint. The standard deviation is 50 cm in winter and 30 cm in summer. The frequency distribution of the deviations is given. The time deviations are

discussed in a similar way. The standard error is about 10 min. *Subject Headings:* **1. Tid forecasting 2. Tide deviations 3. Wind tides 4. Wilhelmshaven, Germany.**—*A.A.*

4.10–178 551.556:532.593 551.46:532.59:525.6(02

Russell, R. C. H. and Macmillan, D. H., **Waves and tides.** London, Hutchinson, 1952 348 p. figs., plates, tables, refs. **GB-MO**—Pt. 1 deals with waves—their characteristics ideal waves, generation, reflection, etc. and their action in moving materials and on structures with a section on wave measuring. Chap. 3 (p. 50–71, 4 figs., 10 refs.) describes generation o waves by wind, effect of fetch, wave heights in open sea (quoting various formulas) in relatio to wind force and duration, decay of waves, wave trains and theories of wave production Pt. II deals with tides, including "Tides and the weather" (p. 266–273, 2 figs., table) includin storm surges and abnormal tides due to wind and pressure. *Subject Headings:* **1. Tide 2. Wave motion 3. Wind waves.**—*C.E.P.B.*

4.10–179 551.556:532.59:551.4

Titov, L. F., **Novye shkaly stepeni volneniia i sostoianiia moria.** [New scales for se swell and state of sea.] *Meteorologiia i Gidrologiia*, No. 5:23–28, **1952.** 3 tables. **DLC**— Critical remarks on the present scales of sea swell which can be classified into two groups a) scales determining the swell by wave height, or b) by the state of sea surface and othe factors including the influence of wind velocity on waves and sea surface. These phenomen should not be confused because the state of sea surface is a qualitative value, and the sea swel is a quantitative value. The author presents three scales for more accurate determination o swell processes. The values of minimal depth of sea are given in tables, for each gradatio of the scale, because the intensity of swell processes depends on the sea depth. *Subject Head ings:* **1. Swell 2. Wind waves.**—*N.T.Z.*

4.10–180 551.556:551.507.352:551.46

U. S. Air Weather Service, **Wind estimation from state of sea observation.** *U. S. Air Weather Service, Technical Report*, 105–84, Feb. 15, **1952.** 12 p. photos. **DWB**—Twenty one photographs of the sea surface from different heights are given as an aid to airplane weathe reconnaissance. *Subject Headings:* **1. Sea surface contours 2. Wind speed estimatio 3. Airplane weather reconnaissance.**—*A.A.*

UPPER AIR WINDS

See also: **Air flow over Nantucket Is., summer 1950** (Malkus, Bunker), 4.10–9; **Statistical analysis of upper air winds, winter, Pretoria** (Hofmeyer), 4.10–44; **Change of relative topography by meridional advection, comparison between advectively and convectively caused temp. changes** (Faust), 4.10–111; **Clear air turbulence at 20,000 ft in frontal zone** (Pothecary), 4.10–170.

4.10–181 551.557:551.510.53

Quiring, Heinrich, **Höhenwind und Kepler-Bewegung.** [Upper wind and Kepler mo tion.] *Zeitschrift für Naturforschung*, 8a(6):395–396, June **1953.** fig., 3 refs. **DWB**— Atmospheric circulation on Jupiter shows a W wind of 200 m/sec near equator but only a few m/sec near poles. There is a similar but stronger W wind in higher atmosphere of the sun On earth W winds prevail between 4 and 16 km, only becoming E at higher levels throug effect of solar radiation on temperature and pressure distribution. Author regards H and H atoms in 800–1000 km height as circulating round the earth in Kepler orbits; calculation give speed as 7.36–7.46 km/sec. *Subject Headings:* **1. Exosphere 2. Upper air winds.**—*C.E.P.B.*

4.10–182 551.557:551.542.

Kiveliovitch, M., **Quelques considérations sur le vent géostrophique.** [Some considera tions on geostrophic wind.] *Journal Scientifique de la Météorologie*, 4(14):61–67, April/Jun **1952.** 2 refs., 39 eqs. English and Spanish summaries p. 61. **DWB**—Author considers al three components of the geostrophic wind in a deduction of an analytic equation of pressur and density in relation to space and time, introducing the equation of continuity and dis

egarding the acceleration terms. Perturbation equations are derived and the case of a barotropic liquid studied. *Subject Headings:* **1. Geostrophic winds 2. Dynamics of the atmosphere.**—*A.A.*

4.10–183 551.558.21:629.13

†Jacobs, L., **Orographic effects on wind with special reference to the safety of aircraft.** *Meteorological Magazine*, London, 82(967):18–26, Jan. **1953.** figs., 30 refs. **MH-BH**—A discussion of waves, sometimes extending to great heights, in the lee of obstacles, with special reference to Gibraltar (J. H. Field and R. Warden), Mt. Fuji (M. Abe) and theoretical studies by F. A. Brooks and H. Rouse. In the discussion R. S. Scorer summarized unpublished work on stability of air streams. A number of others spoke. *Subject Heading:* **1. Lee eddies.**—*C.E.P.B.*

AQUEOUS VAPOR AND HYDROMETEORS

HUMIDITY AND EVAPORATION

See also: **Mean precipitable water, Japan** (Arakawa, Tsutsumi), 4.10–1; **Hydrological Symposium** (Inst. Water Engineers), 4.10–222.

4.10–184 551.571:551.511:551.515.3(76/79)

Carstensen, Louis P., **Relation of large-scale northward flow of moisture to tornado occurrence.** April **1951.** 1 p. 3 graphs. Photostat of typescript. **DWB**—Correlograms for surface pressure difference and dew point in relation to tornado occurrence 12–24 hours later are presented on the basis of data for 1940–50. The area covered comprises 20 midwestern states of the U. S. The charts appear to indicate that tornado development is favored by an intense large-scale northward flow of moisture. *Subject Headings:* **1. Tornado statistics 2. Correlations 3. Moisture transport 4. Mississippi Valley.**—*G.T.*

4.10–185 551.571:551.573

Hohendorf, Eugenuisz, **O zastosowaniu metod wyznaczenia niedosytów wilgotnosci powietrza ze średnich miesięcznych wartości temperatur i prężności pary wodnej.** [The determination of the mean saturation deficit from mean monthly temperature and water vapor pressure data.] *Poland. Państwowy Instytut Hydrologiczno-Meteorologiczny, Wiadomości Służby Hydrologicznej i Meteorologicznej*, 2(1):79–88, **1950.** fig., 9 tables, eqs. **DWB**—Author gives a detailed discussion of the "Olderkop" correction: $e_o = 0.09\ A^2 \frac{d^2E}{dt^2}$; $A = t_m - t_s$; t_m—absolute maximum temperature during a given month, E—saturated water vapor pressure for the temperature $t = t_s$. The average saturation deficit is then $d = E_s - p_s - e_o$; p—average water vapor pressure for the month. Computation tables given and verification of the method for Polish stations presented. *Subject Headings:* **1. Saturation deficit 2. Poland.**—*A.A.*

4.10–186 551.571:6

Oi, Masamichi, **On the effective humidity (1st report).** *Meteorological Society of Japan, Journal, 2nd Ser.*, 29(8):266–273, Aug. **1951.** 2 tables, 5 refs., eqs. In Japanese, English summary p. 273. **MH-BH**—The water content of wood, charcoal, paper, etc. is related to water content of air by the expression $(Ha)^{\alpha} \times (Hr)^{\beta}$, where Ha, Hr are absolute and relative humidity, α and β are characteristics of the substances and depend slightly on their temperature. *Subject Headings:* **1. Humidity effects 2. Effective humidity.**—*C.E.P.B.*

4.10–187 551.571.31:551.553.11(495)

Karapiperis, Leonidas N., **Diurnal variation of relative humidity on sea-breeze days in Athens.** *Meteorological Magazine*, London, 82(971):140–146, May **1953.** 2 figs., 22 refs. **MH-BH**—At Athens (5 km inland) sea breeze from SW or WSW 3–4 hr after sunrise, reaches greatest speed (5 m/sec in winter to 12 m/sec summer) 2–4 pm and ceases 0–2 hr after sunset. Depth about 500 m. Days of regular sea breeze show a double wave of relative humidity; main minimum in afternoon but maxima vary with season. Vapor pressure shows maximum

beginning 18–19 h; Etesian night winds dry. Causes are discussed and illustrated by vertica variation (to 3000 m) in sea breeze and Etesian wind. *Subject Headings:* **1. Diurnal humidity variations 2. Land and sea breezes 3. Athens, Greece.**—*C.E.P.B.*

4.10–188 551.573(94

Gentilli, J., **Die Ermittlung der möglichen Oberflächen- und Pflanzenverdunstung dargelegt am Beispiel von Australien. Das Suchen nach einer Formel.** [The estimation o the possible evapotranspiration, with Australia as example. The search for a formula. *Erdkunde*, 7(2):81–93, June **1953.** fig., tables, 32 refs., 12 eqs. English summary p. 81 **DWB**—Formulas for evaporation E_w from a free water surface are reviewed. The earlie ones, e.g., J. A. PRESCOTT's, give good results for Australia but involve saturation defici which is not generally known. Definition of potential evapotranspiration E_p is discussed an formulas of H. F. BLANEY and C. W. THORNTHWAITE compared with Australian data an criticized. M. H. HALSTEAD's 1951 theoretical formula $E_p = CL(\rho'_{T\max} - \rho'_{T\min})$, C = const. L—duration of daylight, ρ —water content of air, is found to agree with Australian data and chart for northern Australia is prepared. *Subject Headings:* **1. Evaporation 2. Evapotrans piration 3. Australia.**—*C.E.P.B.*

CONDENSATION

See also: **Ice crystals in air** (Itoo), **4.10–213.**

4.10–189 551.574.

Facy, L., **Nature et structure des noyaux de condensation.** [Nature and structure o condensation nuclei.] *Journal Scientifique de la Météorologie*, 4(14):68–77, April/June **1952** 2 plates, 6 refs. English and Spanish summaries p. 68. **DWB**—Smallest condensation nucle (10^{-6}–10^{-5} cm) always show liquid structure, because supersaturation of dissolved salt i never great enough to cause embryo-germ of crystal (shown by theoretical discussion). Nucle photographs, which are made in the high vacuum of electronic microscope, are shown. Suc photos show shapeless glassy residues, unless necessary precautions are taken when pumping Rough classification of the more complex structure of nuclei above 10^{-5} given. Most con densation nuclei contain sodium chloride. *Subject Headings:* **1. Condensation nuclei 2. Salin nuclei.**—*A.A.*

4.10–190 551.574.1:551.586:615.83

Flach, Emil, **Meteorologisch-bioklimatische Kernzahluntersuchungen im Bereich de Mittelgebirges und der Ostseeküste.** [Meteoro-bioclimatic nuclei investigations in Mittel gebirge and Baltic coast.] *Germany. Deutscher Wetterdienst in der US-Zone, Berichte* No. 42:158–164, **1952.** 2 figs., table, 10 refs. **DWB**—Continuous records of nuclei counts i Mittelgebirge (winter) and Baltic coast (summer) and in neighboring towns form a basis fo evaluation of health resorts from point of view of colloid meteorology. *Subject Headings* **1. Condensation nuclei count 2. Medical climatology 3. Germany.**—*C.E.P.B.*

4.10–191 551.574.

Hess, Victor F., **Further determinations of the concentration of condensation nuclei i the air over the North Atlantic.** *Journal of Geophysical Research*, 56(4):553–556, Dec. **1951** 2 tables, 5 refs. **DWB**—Condensation nuclei counted on voyage from New York to Le Harv and back (summer 1951). Results presented together with weather observations. Air i the western half of the Atlantic contained more nuclei (1512 and 1229/cm³) than in the easter half (462 and 887/cm³). *Subject Headings:* **1. Condensation nuclei 2. Nuclei count 3. Nort Atlantic.**—*A.A.*

4.10–192 551.574.

Inn, Edward (*U. S. Air Force, Cambridge Res. Center*), **Theory of droplet coagulation** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 13:77–85, Ma **1952.** 9 refs., eqs. Discussion p. 82–84. **DWB**—Smoluchowski's classical theory of co agulation is reviewed and his coagulation equation applied to coagulation processes in natura clouds. Effects of surface tension, of electric charges in droplets and of attractive or repulsiv

orces due to evaporation or condensation are considered. The author also refers to experiments conducted at Columbia University, from which it would appear that not every collision etween particles results in a coalescence. *Subject Headings:* **1. Coagulation 2. Drop charge . Raindrop coalescence. I. Colloquium on Microwave Meteorology, Aerosols and Cloud hysics.**—*G.T.*

FOG

See also: **Equipment and instruments used in sea fog observations, Ochiishi, 1951** (Tabata), 4.10–54; **Heat transfer studies** (Saxena), 4.10–153; **Meteorological situation around fog proof forest, 4.10–154.**

4.10–193 551.575.1:551.524.4

Izawa, T., **Vertical distribution of temperature in sea fog.** *Journal of Meteorological Research*, Tokyo, v. 4, Suppl. Number, p. 25–31, March **1952.** 6 figs., 24 eqs. In Japanese, English summary p. 321–322. **MH-BH**—A solution is obtained for the equation of eddy heat ransfer in warm air moving over a cold ocean current. An inversion is shown to form and ntensify, extending downwind by 130 km in 5 hrs, and increasing in height from surface to .8 km. The variation of vertical temperature distribution developing in a secondary inersion formed near the coast and the diurnal variation of ground surface temperature are lso discussed. *Subject Headings:* **1. Fog formation 2. Temperature inversions 3. Japan.**—*C.E.P.B.*

4.10–194 551.575.1

Morita, Y., and Tabata, T., **On the sea fog invasion over Nemuro and Kushiro District 1st Report).** *Journal of Meteorological Research*, Tokyo, v. 4, Suppl. Number, p. 71–74, March **1952.** fig., 3 tables, 2 refs. In Japanese, English summary p. 325. **MH-BH**—Obervations with thermograph and fog water meter at 17 stations in Nemuro and Kushiro oastal district during sea fogs, July 20–Aug. 31, 1951, are tabulated. The inland limit of ea fog was placed at 30 km from the coast. *Subject Headings:* **1. Fog formation 2. Japan.**—*C.E.P.B.*

CLOUDS

See also: **Air flow over Nantucket Is., summer 1950** (Malkus, Bunker), 4.10–9; **3-dimensional structure of fronts** (Matthewman), 4.10–130.

4.10–195 551.576.1

Scorer, R. S., **Cloud streets.** *Gliding*, London, 3(4):167–169, Winter **1952/53.** 3 photos. **DWB**—Photographs of cumulus clouds forming in rows are presented and discussed. From arious suggestions as to their formation and perpetuation the author concludes that the main equirement for cloud streets to occur is for heating to be slow but just sufficient to support onvection. (For criticism and author's reply to it *see item* 4.10–196 below.) *Subject Headngs:* **1. Cloud formation 2. Cloud lanes.**—*G.T.*

4.10–196 551.576.1:551.576.11

Rivers, Peter, **Thermal sources and cloud streets.** *Gliding*, London, 4(1):18–21, Spring **953.** figs. Reply by R. S. Scorer, p. 21. **DWB**—The author refers to an article on "Cloud treets" by R. S. Scorer (*see item* 4.10–195 above) and disagrees with it on two major points requirement of weak convection; importance of the behavior of upper air). He believes hat a detailed study of the thermal source as a heat exchanger will reveal the mechanism of oll cloud formation. He suggests such a mechanism and discusses its operation under various ind conditions. In his reply Scorer points to a number of theoretical weaknesses and inongruities in the interpretation offered by Rivers. *Subject Headings:* **1. Cloud formation . Cloud lanes 3. Thermals. I. Scorer, R. S.**—*G.T.*

4.10–197 551.576.1

Scorer, R. S., **Mammatus.** *Meteorological Magazine*, London, 82(968):57, Feb. **1953.** hoto: **MH-BH**—Photo of mammatus cloud, Andorra, July 15, 1952, 2 hours after a thunder-

storm, and discussion of cause (descending air). *Subject Headings:* 1. **Mammatus cloud** 2. **Andorra.**—*C.E.P.B.*

4.10–198 551.576.1

Rhead, D. W., **Mammatus cloud, Rickinghall, Suffolk, October 24, 1952.** *Meteorological Magazine*, London, 82(972):188–189, June **1953.** 2 photos. **MH-BH**—Unusually good mammatus at a height of 5–6000 ft shortly after a thunderstorm. Probably due to marked instability up to 500 mb level. *Subject Headings:* 1. **Mammatus clouds** 2. **Suffolk, England.**—*C.E.P.B.*

4.10–199 551.576.12:551.515.

Scorer, R. S., **Watching the sky.** *Science Progress*, 41(161):54–57, Jan. **1953.** 3 photos **DWB**—Brief account of cloud classification in relation to air masses and fronts. *Subject Heading:* 1. **Cloud classification.**—*C.E.P.B.*

PRECIPITATION

See also: **Determination by centimeter radar of fine structure of clouds and rain regions** (Schweitzer), 4.10–36; **Utility of radar in measuring areal rainfall** (Stout, Neill), 4.10–37; **Unusual Aug. weather, S. Spain and Portugal** (Ward), 4.10–120; **Meteorology applied to architecture in winter** (Guminwki), 4.10–148; **Pressure changes by precipitation** (Noth), 4.10–162; **Adjusting snow runoff correlation curves by use of autumn precipitation** (McLean), 4.10–218; **Geographical consideration of Po flood, Polesine, Nov. 1951–May 1952** (Gambi), 4.10–221.

4.10–200 551.57

Garrigue, Hubert, **Recherches sur les précipitations atmosphériques à l'échelle du globe** [Research on atmospheric precipitation on a global scale.] *Académie des Sciences, Paris, Comptes Rendus*, 234(15):1571–1573, April 7, **1952. DWB**—In connection with observations on the reduction of radioactive pollution in the atmosphere between 1946 and 1951 the author investigated the variations in precipitation over the entire earth during this period. The world is divided into 8 regions: 1) North America, 2) South America, 3) Europe, 4) India, 5) Japan, 6) Australia, 7) South Africa and 8) Philippines, and mean monthly precipitation for 1949 is compared with the normals. An increase in mean annual precipitation is noted for 1949 and 1950. *Subject Heading:* 1. **Global precipitation.**—*I.L.D.*

4.10–201 551.577(54

*Ramakrishnan, K. P., **Normal rainfall for each degree square of co-ordinates for the Indian Peninsula, south of latitude 15°N.** *Indian Journal of Meteorology and Geophysics*, Delhi, 3(1):64–68, Jan. **1952.** 6 figs., 4 tables. **MH-BH**—Monthly average rainfall in inches for each degree square and annual average rainfall in inches for the Indian Peninsula south of lat. 15°N have been computed and are shown on maps. Tables giving the area of land portion in each degree square in square miles, the weights of water precipitated as rain over land areas during the months June–Sept. and Oct.–Dec. in a normal year in millions of tons and weight of water precipitated as rain over land area during the whole year in millions of tons are presented. *Subject Headings:* 1. **Precipitation data** 2. **Indian.**—*I.L.D.*

4.10–202 551.577(595,95) 551.58

*Schmidt, F. H. and Ferguson, J. H. A. (*eds.*), **Rainfall types based on wet and dry period ratios for Indonesia with Western New Guinea.** *Indonesia. Djawatan Meteorologi dan Geofisik, Verhandelingen*, No. 42, **1952.** 77 p. mostly tables, 4 figs., 3 maps (fold.), 7 refs. **DWB**—After reviewing the climate classification systems of KÖPPEN, THORNTHWAITE and MOHR, the authors describe their own climate classification system, which is a modification of MOHR's. The precipitation limits of MOHR ($\leq$60 mm per month—dry, $\leq$100 per month—wet and 10–100 mm per month—moist) are used and the quotient between the mean number of dry and wet months (per a period of 20 years) is determined. Eight types of climates with different values of Q are established. A nomogram for determining the classes is given

Tables are given for every rainfall station giving height, period of record, number of dry and wet months maximum and frequency of each, Q, Schmidt-Ferguson type, Köppen classification and general mean of rainfall. Maps showing the climatic classification of Java-Medura according to Köppen and rainfall types based upon wet and dry period ratios, and of Indonesia and Western New Guinea, based upon wet and dry period ratios, are included. *Subject Headings:* **1. Rainfall data 2. Climatic classifications 3. Indonesia 4. Western New Guinea.**—*I.L.D.*

4.10–203. 551.577(593)

*Thailand. Meteorological Dept., **Monthly and annual rainfall of Thailand for 1950, 1951.** July 1, **1952.** 2 pieces. Mostly tables. t-p. and preface in Thai and English. **DWB**—Includes data for 94 stations, with normals and departures from normal (25–38 years of record) for each month at each station. Data are collected by several services, but are mostly obtained from Negretti and Zembra 8 in. rain gages. *Subject Headings:* **1. Precipitation data 2. Thailand. I. Bunnag, Charon** (*Dir. Met. Dept. RNT*).—*M.R.*

4.10–204 551.577.2(569)

*Ashbel, Dov (*Hebrew Univ., Jerusalem*), **Die Niederschlagsverhältnisse im südlichen Libanon, in Palästina und im nördlichen Sinai.** [Distribution of precipitation in southern Lebanon, Palestine and in northern Sinai.] Berlin, **1930.** 77 p. 25 figs., 17 tables, refs. **DLC**—After giving an historical account of the establishment of meteorological stations and of the recording of observations from about the middle of the 19th century to 1930 in southern Lebanon, Palestine and northern Sinai and a brief description of the geography of this area, the author discusses in detail the annual course of precipitation month by month and the variations of the distribution of annual precipitation totals in this region. Statistical data give annual precipitation totals for each station and monthly mean maximum and minimum, interannual variation, precipitation periods and mean and maximum rainfall per period, days with rain per month and daily amounts, and maximum for each station with available records, isohyetal charts are drawn for each month. The rainfall characteristics are analyzed with reference to circulation patterns and pressure and temperature regime. *Subject Headings:* **1. Precipitation distribution 2. Precipitation data 3. Long period records 4. Lebanon 5. Palestine 6. Sinai.**—*I.L.D.*

4.10–205 551.577.3:523.746(495)

Karapiperis, Leonidas N., **The variation of rainfall in Greece in relation to sunspots.** *Beiträge zur Geophysik*, 63(2):149–161, **1953.** 3 figs., 6 tables, 21 refs. **DWB**—Rainfalls at 22 stations, 1896–1940, in year, winter and summer were compared with 11 year sunspot cycles. Three main types were found: a) single oscillation, nearly parallel to sunspot curve; b) double oscillation, primary maximum at spot maximum, and c) double oscillation, primary maximum at spot minimum. Relation best shown in winter. *Subject Headings:* **1. Rainfall variations 2. Sunspot effects 3. Greece.**—*C.E.P.B.*

4.10–206 551.577.37(43)

Huttary, Josef, **Grosse Tagesmengen des Niederschlags in ihrer Verteilung und Häufigkeit in Deutschland.** [Distribution and frequency of large daily rainfalls in Germany.] *Germany. Deutscher Wetterdienst in der US-Zone, Berichte*, No. 38:161–166, **1952.** 3 figs., 3 tables, 14 refs. **DWB**—Frequency of daily rainfalls in Germany exceeding 50 mm in 1934–41 are mapped and the annual variation shown for each year. *Subject Headings:* **1. Excessive rainfall frequencies 2. Germany.**—*C.E.P.B.*

4.10–207 551.577.37(492)

Levert, C., **Nieuwe records: de grootste intensiteit in een zeer zware regen.** [New records: the greatest intensity in very heavy rainfall.] *Hemel en Dampkring*, 50(6):102–104, **1952.** 2 figs. **MH-BH**—Popular account of greatest rainfall intensities measured in the Netherlands from 1930 to 1951. Data on 7 measurements are tabulated, including a rainfall of 10 mm in 3 minutes, and 42 mm in 30 min. A pluviogram obtained on July 14–15, 1930 and a precipitation chart prepared for the same days are presented. *Subject Headings:* **1. Excessive rainfall 2. Rain intensities 3. Precipitation charts 4. Netherlands.**—*G.T.*

4.10–208 551.577.3

Levert, C., **De zware plasregens in de vroege ochtend van 9 Augustus 1951.** [The heavy downpour in the early morning of Aug. 9, 1951.] *Hemel en Dampkring*, 49(10):174, 1951 fig. **DLC**—Chart of the Netherlands shows areas where rain fell (up to 5 or 6 in. in a few hours). Two rain-gages at Amsterdam showed a difference of 60 mm (149 and 90 mm) with a maximum intensity of 3.5 and 2.7 mm/min. respectively. *Subject Headings:* **1. Excessive rainfall 2. Rainstorms 3. Amsterdam, Netherlands.**—*M.R.*

4.10–209 551.577.3:551.579.

Griffith, G. (*Imperial Col. of Trop. Agri., Trinidad*), **Interception of rain water by vegetable mulch.** *Tropical Agriculture*, St. Augustine, Trinidad, 29(1/3):50–53, Jan./March **1952.** 2 tables, graph. **DWB**—Experimental evidence is presented that under Trinidad conditions the soil under a mulch is not wetter than bare soil, for the mulch intercepts the rainwater before it reaches the soil. The percentage of rainfall interception was high with low rainfall intensity and low with high rainfall intensity. *Subject Headings:* **1. Precipitation interception 2. Rain intensities 3. Mulch 4. Trinidad.**—*I.L.D.*

4.10–210 551.578.1

Hitschfeld, W. and Gunn, K. L. S. (*McGill Univ., Montreal*), **Coalescence of large and small water drops.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 13:51–72, May **1952.** 10 figs., 13 refs., eqs. **DWB**—LANGMUIR-BLODGETT' theory of collection of small cloud droplets by larger precipitation particles is reviewed and an experiment conducted with a view of investigating some of its aspects, described. Total increase in the mass of water droplets of 1.59 mm radius falling through a chamber filled with cloud about 3 m high was measured. In comparing experimental with calculated values the author concludes that: "(1) Langmuir's aerodynamic theory of collision is valid. (2) Every collision between a drop and a droplet results in coalescence. (3) The phenomena are insensitive to electric charges of the magnitude encountered in nature." Average collection efficiency as a function of cloud droplet radius is also analyzed and graphically represented. *Subject Headings:* **1. Raindrop coalescence 2. Langmuir's theory. I. Colloquium on Microwave Meteorology.**—*G.T.*

4.10–211 551.578.11:551.515.

Takeuchi, U. and Nakazawa, Z. (*Shinsyu Univ., Nagano*), **On the relation between chlorinity of rain water and air mass.** *Geophysical Magazine*, Tokyo, 23(1):21–24, Dec. 1951 2 figs., 10 refs. **MH-BH**—Classification of trajectories of air masses near Japan is given. Chlorinity of rain water in maritime air masses up to 40 mg/l and about 12 mg/l in continental air masses. *Subject Headings:* **1. Chlorinity of rainwater 2. Air masses 3. Japan.**—*A.A.*

4.10–212 551.578.1

Troesch, Hans A. and Grassmann, Peter, **Zum Verteilungsgesetz der Tropfengrössen bei der Zerstäubung.** [Law of distribution of drop sizes on atomization.] *Zeitschrift für angewandte Mathematik und Physik*, 4(1):81–85, Jan. 15, **1953.** fig., 3 refs., 6 eqs. English summary p. 85. **MH-BH**—Formulas for statistical distribution of drop size, surface and volume, formed by an atomizer, are developed, including maximum drop diameter and stability. These fit experimental data. *Subject Heading:* **1. Drop size distribution.**—*C.E.P.B.*

4.10–213 55.578.4 551.574.

Itoo, K. (*Met. Res. Inst., Tokyo*), **On ice crystals in the air.** *Geophysical Magazine*, Tokyo, 23(4):407–408, May **1952.** 2 figs., 2 plates. **MH-BH**—Ice crystals in the air or ice needles observed at Hailar, North Manchuria, are classified according to their forms, and photomicrographs of hexagonal plates and of twin prism crystals and frequency curves of the number of hexagonal twin prisms are shown. Dimensions of crystals that have been photographed are as follows: mass—$0.14\times10^{-6}\mu$ per both hexagonal twin prism and plate crystals; length of principal axis of hexagonal twin prism—$2c=83.0\mu$; of auxiliary axis of hexagonal twin prism—$2a=83.5\mu$; of auxiliary axis of hexagonal plate—$2a=100.5\mu$. *Subject Headings:* **1. Ice crystals 2. Ice crystal classification 3. Hailar, Manchuria.**—*I.L.D.*

4.10–214 551.578.46(73)

Wilson, Walter T. and Tarble, Richard D. (*U. S. W. B., San Francisco*), **Estimated equencies and extreme values of snow-pack water equivalent at major cities in the United ates.** *American Geophysical Union, Transactions*, 33(6):871–880, Dec. **1952.** 11 figs. **H-BH**—The limited number of direct observations of weight of snow pack, particularly in opulated localities has made it necessary to study relations between observed or estimated eight of snow pack and other parameters. Fair relations have been established at stations aving suitable data, and have been generalized on the basis of the good areal distribution of vo parameters that are available in convenient published form: depth of snow on the ground nd accumulated seasonal snowfall. The results seem to be consistent with the limited snow- rvey data available in the area of interest and with other sources. The water equivalent accumulated seasonal snow pack that may be equaled or exceeded once in 50 years (about e maximum record) is about seven per cent of the maximum seasonal snowfall and about pct of the maximum observed snow depth in inches. The values of water equivalent to be ualed or exceeded one year in ten are 75 pct, and one year in two are about 50 pct, of the aximum record. *Subject Heading:* **1. Snow pack.**—*Author's abstract.*

4.10–215 551.578.7

Israël, H., **Neuere Anschauungen und Versuche zur Erklärung der Hagelbildung.** [New ews and attempts at explanation of hail formation.] *Umschau*, 53(13):385–388, July 1, 953. 2 figs., 11 refs. **DWB**—Hail is associated with thunder and regional, seasonal and urnal distribution is similar but with important differences. Structure and form of hail- ones are described and related to microphysics of cloud layers. The conical shape is regarded fundamental as in rime. The layer structure is also analogous to that of rime and attributed changes in size of cloud droplets, or possibly by passing up and down through 0°C level. *ubject Heading:* **1. Hail formation.**—*C.E.P.B.*

HYDROMETEOROLOGY

See also: **Forecasting highest water levels and most rapid rises of Lake Constance** (Gasser), 4.10–81; **Interception of rain water by mulch** (Griffith), 4.10–209; **Micro-climatology, snow melt** (Thams), 4.10–236.

4.10–216 551.579(02)

*Luchsheva, A. A., **Prakticheskaia gidrologiia.** [Practical hydrology.] Leningrad, idrometizdat., **1950.** 290 p. 70 figs., 125 tables, 46 refs., 164 eqs., appends. **DLC**—This ook contains a wealth of information on results of hydrological and hydrometeorological search work carried out during recent years by Russian scientists. A large number of rmulas and methods are listed and described for the student and the practicing hydrologist, ut no attempt was made to give a critical account or to show the limits of applicability. In rticular the following fields are covered: hydrographic characteristics of rivers and their tchment areas, regime of water levels and discharges, ice phenomena, hydrometric problems, imatic characteristics of catchment areas (computation of mean precipitation, water serves of snow, saturation deficit, evaporation from water surfaces, evapotranspiration, etc.), noff norms, runoff variability, seasonal variation of runoff, flood and minimum discharges, ver level and limnology. Numerous nomograms are given, as well as fragmentary hydrologic ata and maps, mainly for the European part of the Soviet Union, showing the distribution hydrologic parameters, data of freezing and breaking up of rivers, spring floods, maximum infall, annual and seasonal runoff and its variability. A special appendix includes data in e form of characteristic parameters for the geographic distribution of intense rainfall. *Sub-ct Headings:* **1. Hydrology 2. Hydrologic maps 3. Textbooks 4. U.S.S.R.**—*A.A.*

4.10–217 551.579.1:519.24

Law, Frank, **The estimation of the reliable yield of a catchment by correlation of rainfall nd run-off.** *Institution of Water Engineers, Journal*, 7(3):273–293, May **1953.** 4 figs., 7 bles, 9 refs. **GB-MO**—Straight-line formulas relating rainfall to runoff in Derwent Valley e calculated for various periods to determine risk of error. Allowance for dry years should

be based on standard deviation of local rainfall and a map is given of calculated rainfall in driest year in British Isles as percentage of average. A method of calculating runoff in 3 dry years is set out. *Subject Headings:* **1. Runoff 2. Statistical techniques.**—*C.E.P.B.*

4.10–218 551.579.2:551.577.32(711

*McLean, Duart A., **Adjusting snow-runoff correlation curves by use of autumn precipitation.** *Western Snow Conference, Proceedings 1948*, p. 105–116, Feb. 1949. 3 figs., 5 tables, 6 refs. **DWB**—Data on water content of snow in British Columbia watersheds give such poor correlation with subsequent runoff that weights must be applied before forecasts are made. Rainfall and temperature at time of runoff are important, but one factor which can be easily evaluated is the pre-snowfall or autumn rainfall which saturates the soil if excessive and leads to increased or earlier runoff. Records for a number of stations for Aug., Sept. and Oct. are calculated for 13 basins, and departures from normals for each year (1941–1947) used to test the value of the factors which were derived from these data. *Subject Headings:* **1. Snow-runoff correlations 2. Precipitation variations 3. Rainfall influences 4. British Columbia.**—*M.R.*

4.10–219 551.579.3:551.583.7

Rogstad, Olaf, **Variations in the glacier mass of Jostedalsbreen.** *Journal of Glaciology* 1(10):551–556, Oct. **1951.** 4 figs. Summary in English and German p. 551. Finsterwalder R., **The glaciers of Jostedalsbreen.** *Ibid.*, p. 557–558. 2 figs., 2 refs. **DWB**—Rogstad compared annual runoff from two glacier-fed lakes in W. Norway with that from a lake not fed by ice (data 1900–1947). The difference gives a measure of change of volume of ice-sheet. Advance or retreat of outflow glaciers occurs 4 years after computed increase or decrease. Average annual decrease = 0.4 m of water × glaciated area. Precipitation on the glacier is calculated; winter snowfall averaged 1860 mm. water. Some agreement is found graphically between variations of mass of glacier and average temperature May through Sept. as well as with snowfall. Finsterwalder describes measurements of flow of glacier. *Subject Headings:* **1. Glacial runoff 2. Glaciers 3. Norway. I. Finsterwalder, R.**—*C.E.P.B.*

4.10–220 551.579.4:627.8

The equatorial Nile project and its effects in the Sudan. *Geographical Journal*, 119(1):33–48, March **1953.** 6 figs., 11 photos. **DWB**—This paper prepared by members of the Jongle Investigation Team and edited by P. P. Howell, describes the White Nile and proposals to control the flood waters to give a regular supply for irrigation in 99 years out of 100 by storage and by eliminating loss in the Sudd marshland. The way in which agriculture will benefit is discussed, and the stages of the long-term plan set out. *Subject Headings:* **1. Nile floods 2. Water resources 3. Sudan. I. Howell, P. P.** (*ed.*).—*C.E.P.B.*

4.10–221 551.579.4:551.577.37(45)

Gambi, Lucio, **Geographische Betrachtungen zur Überschwemmungen des Po in Polesine (November 1951 bis Mai 1952).** [Geographical considerations on the flooding of the Po in Polesine, Nov. 1951–May 1952.] *Die Erde*, Berlin, 1:15–29, **1953.** 4 figs., chart. **DLC**—The flood was due to three breaks in the left bank, following excessive rain in the whole basin on Nov. 7–12, averaging 236 mm and up to 418 mm. The flooded area was nearly 2×10⁹ (2 billion) m², and in lowest places depth exceeded 6 m. Damage and reclamation work are described. Earlier floods are compared. *Subject Headings:* **1. Floods 2. Excessive rainfall 3. Po Valley, Italy.**—*C.E.P.B.*

4.10–222 551.579:628.1 551.573

Institution of Water Engineers, Hydrological symposium, **1. Hydrological measurements 2. Estimation of yield (overground).** Co-ordinated by J. Kennard. **3. Estimation of yield (underground).** By Stevenson Buchan. **4. Some observations on pumping tests carried out on chalk wells.** By J. Ineson. *Institution of Water Engineers, Journal*, 7(3):175–272, May **1953.** 9 figs., 5 tables, refs. Discussion p. 226–272. **DWB**—The symposium was held in London Nov. 12, 1952. Pt. 1, A, "Precipitation," described the recording of rainfall, preparation of averages and estimates of general rainfall (6 refs.); B, "Evaporation and percolation," set out modern techniques of estimating evaporation from water and land surfaces

d water balance (16 refs.); C, is "Measurement of runoff" (9 refs.). Pt. 2 describes estima-n of yield of a reservoir impounding water from a catchment or drainage area (6 refs.); and 3 the functions and yield of an aquifer (19 refs.). Pt. 4 sets out formulas associated with nsmissibility and storage. *Subject Headings:* **1. Hydrology 2. Evaporation measurement Underground water 4. Symposia. I. Buchan, S. II. Ineson, J. III. Kennard, J.**—*E.P.B.*

CLIMATOLOGY AND BIOCLIMATOLOGY

CLIMATOLOGY

See also: **Sea and weather observations, Antarctic whaling ground, 1950–51** (Hanzawa and others), 4.10–42; **Importance and limits of phenology for climatology** (Berg), 4.10–46.

4.10–223 551.58:6

Bova, N. V., **O zadachakh klimatologii v sviazi so stroitel'stvom gidroelektrostantsii na lge, orositel'nykh sistem v Povolzh'e.** [Climatological problems in connection with the nstruction of hydroelectric stations on the Volga River, water supply and irrigation in ions of the Volga and Caspian Sea.] *Vsesoiuznoe Geograficheskoe Obshchestvo, Leningrad estiia*, 84(3):304–306, May/June, **1952. DLC**—An outline of the climatological investiga-ns to be carried out in connection with the 1951–1956 development program of the Volga d Caspian regions is given. These studies are concerned with the effect of climate upon the eration of high voltage power stations, and upon water transport and water reservoirs, with ricultural climatology including evaporation from irrigation canals and reservoirs and croclimate of fields and forests; with the effect of climate upon the development of pasture d afforestation and with the amelioration of climatic conditions. *Subject Headings:* **1. Ap-ed climatology 2. Hydroelectrical engineering 3. U.S.S.R.**—*I.L.D.*

4.10–224 551.58:63

Searle, Sydney A., **Plant environment and the grower.** London, C. F. Casella, **1952.** p. 26 figs., 48 refs. **GB-MO**—This booklet for the practical grower describes conditions a glass house and in the open in southern England, and their importance to crops. Simple truments are illustrated. Sections take up: soil temperature, air temperature, humidity, movement (including effect of shelterbelts) sunlight and light, transpiration and soil isture. A new instrument, the 'Gallenkap' soil moisture tensiometer, is described and ults of measurements set out in detail. Finally, application of water to the soil is discussed the most important single factor in horticultural production. *Subject Headings:* **1. Agri-ltural climatology 2. Horticulture.**—*C.E.P.B.*

CLIMATE OF PARTICULAR PLACES

See also: **Rainfall, Lybia** (Fàntoli), 4.10–4.

4.10–225 551.582(54)

Reiner, Ernst, **Das Dehra Dun.** [Dehra Dun.] *Petermanns Geographische Metteilungen*, (1):1–12, **1953.** 21 figs., 2 tables, 15 refs. **DLC**—Dehra Dun lies at 800 m in 30°15′N, °5′E, between Siwalik Hills and Himalayas. Climate (p. 1–6) is subtropical with a short ense monsoon from late July to mid Sept. (mean 1827 mm in 86 days). The dry season ngs night frosts and hot midday winds. The remainder of the paper describes fauna and ra, settlements and relief. *Subject Headings:* **1. Local climates 2. Dehra Dun, India.**—*E.P.B.*

4.10–226 551.582(62):551.482(02):631

Hurst, H. E., **The Nile: a general account of the river and the utilization of its waters.** ndon, Constable, **1952.** 326+p. 27 figs., 32 photos., tables. Review by G. W. Murray in: *ographical Journal*, 109:104–105, **1953. DLC**—This comprehensive book covers the whole le valley from the Great Lakes and Ethiopia to the sea, including present conditions and

ancient history, irrigation and its effects, hydrology and new proposals. Climate is considered on p. 168–181 with plots of monthly mean temperature and rainfall and chart of annual isohyets. Then follow effects on health and vegetation. Hydrological studies are described, including Nile gage reading and analysis, loss by evaporation, relation of lake levels to sunspots (recent years have shown no evidence of a relation), flood forecasting, etc. Finally, the various Nile projects are discussed. *Subject Headings:* **1. River hydrology 2. Climate of Nile Valley 3. Nile Valley. I. Murray, G. W.**—*C.E.P.B.*

4.10–227 551.582.1:551.586:63(682)

Whitmore, J. S., **Our climate.** *Farming in South Africa*, 27(312):92, 108, March **1952** DWB—Brief discussion of climate, growing season, rainfall, temperature, influence of ocean currents, elevation, etc. and relation to agriculture in South Africa at present and in the earliest days of settlement (1652+). *Subject Headings:* **1. Climate of South Africa 2. Agricultural climatology 3. Union of South Africa.**—*M.R.*

4.10–228 551.582.2(664)

*Sierra Leone. Meteorological Service, **Statistics illustrating the climate of Sierra Leone 1951.** Freetown, Printed by the Govt. Printer, **1952.** 58 p. 49 tables, 4 refs. **DWB**—For every station with available data the following climatological data are given: mean rainfall, seasonal distribution, rainfall variability (monthly median, quartile and extreme rainfall), probability that rainfall may differ from mean by given percentages, secular rainfall variations of frequency and intensity of rainfall, mean number of wet days and with given amounts of rain, diurnal rainfall variations; mean monthly temperature, mean daily range, mean daily minimum and maximum, absolute minimum and absolute maximum, mean temperature at fixed hours, mean diurnal variation, temperature frequencies, mean wet bulb at fixed hours, mean and minimum relative humidity; mean pressure and minimum pressure, mean diurnal variations of pressure; duration of sunshine, cloudiness amount, surface wind frequencies by season; mean number of days with thunder and days with fog. All the stations and their locations are listed. An analysis of the climatic data is presented. *Subject Headings:* **1. Climatic data 2. Climate of Sierra Leone 3. Sierra Leone. I. Bartrum, P. C.**—*I.L.D.*

4.10–229 551.582.2(797)

*Steele, Robert W. (*comp.*) (*Wind River Experimental Forest*), **Wind River climatological data, 1911 to 1951.** Portland, Oregon, U. S. Dept. of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station, May **1952.** 21 p. 17 tables (fold). **DWB**—Observations have been made at Wind River, Wash. (in the Cascade Mountains, 7 miles north of the Columbia River) by the U. S. Forest Service since the fall of 1910. Work was expanded in 1922. The observations have been made in a clearing with gradually increasing timber surrounding, so that wind speeds have slowly decreased. Monthly air and soil temperature data, humidity, thunderstorms, freeze, growing season, precipitation, snow, wind, cloudiness, evaporation, and other data are presented by years since 1941 and as averages for 1911–1930, 1931–1940, 1941–1950 and 1911–1950, wherever applicable. Snow and thunder storms and frost data are given for every year (1911–1950). A brief general discussion of the location, climate and significant extremes and averages is included. *Subject Headings:* **1. Climatic data 2. Wind River, Washington. I. U. S. Forest Service. Pacific Northwest Forest and Range Experiment Station.**—*M.R.*

4.10–230 551.582.3(51)

Anuchin, V. A., **Geograficheskiĭ atlas Kitaĭskoĭ Narodnoĭ Respubliki.** [Geographical atlas of Chinese People's Republic.] *Priroda*, Moscow, 9:69–72, Sept. **1952. DLC**—A description of the third edition of the atlas which appeared in 1951. Climatic maps and description of characteristics of individual meteorological variables, in particular rainfall, are included. *Subject Headings:* **1. Atlases 2. China.**—*I.L.D.*

CLIMATIC CHANGES

See also: **Glacier mass variations, Jostedalbreen** (Rogstad, Finsterwalder), 4.10–219.

4.10–231 551.583

†Gumiński, Rumuald, **35-letie "okresy" wahań klimatysznych Brücknera w świetle imatologii dzisciejszej.** [35 year Brückner climatic cycle from the point of view of radiation imatology.] *Poland. Państwowy Instytut Hydrologiczno-Meteorologiczny, Wiadomości Służby,* 1(4):295–307, **1949.** 6 figs., 31 refs. French summary p. 306. **DWB**—BRÜCKNER's heory of 35-year periods of climatic variation is critically analyzed and discussed on the basis modern climatology and statistical mathematics. In perfect agreement with the opinion xpressed by the Austrian geophysicist WAGNER, the author concludes that BRÜCKNER's hypothesis is erroneous and is of historical significance only. *Subject Headings:* **1. Brückner's ycle 2. Climatic variations.**—*A.M.P.*

4.10–232 551.583:551.21

Northcott, Ruth J. (*Asst. ed., R.A.S.C. Journ.*), **Volcanoes and world weather.** *Royal stronomical Society of Canada, Journal,* 46(5):210–212, Sept./Oct. **1952. DWB**—This note a brief review of three scientific contributions: 1) A presidential address by ANDREW THOMSON Met. Serv., Canada) at the "at-home" of the R.A.S.C. in 1951, on meteorological and ornithogical evidence of a rise (by 5 degrees) in Canadian winter temperatures; 2) "Volcanoes and orld climate," a paper by H. WEXLER (*see item* 4.3-252, March 1953, *MAB*) and 3) the heory of W. J. HUMPHREYS which derives climatic changes (even major ones, as the onset of n ice age) from ground-level temperature differences due to the presence of continuously purished volcanic dust palls over certain areas. According to the theory (recently revived y the discovery of dust particles as condensation nuclei and consequently of the possibility increased cloudiness due to volcanic dust) the difference in temperature between overnadowed and clear areas would cause changes in the circulation and the weather. *Subject eadings:* **1. Climatic changes 2. Volcanoes. I. Thomson, A. II. Wexler, H. III. Humhreys, W. J.**—*G.T.*

4.10–233 551.583

Takahashi, Koichiro, **Climatic change.** *Journal of Geography,* Tokyo, 61(2):1–4, **1952.** ables, diagrs. In Japanese, English summary p. 4. **DWB**—Table of 10 year running mean emperatures for Spitsbergen shows definite rise in temperature from −1.3°C (1895–1904) o 4.0°C (1929–38). Similar changes are shown for Japan 1870–1950, in both temperature and recipitation although not as consistent, or as marked. The changes are attributed to results f solar activity and to the vast heat capacity of the ocean. *Subject Headings:* **1. Climatic hanges 2. Warming of Arctic 3. Japan 4. Spitsbergen.**—*M.R.*

MICROCLIMATOLOGY

See also: **Phenology of deciduous trees, application to local climatology** (Baumgartner), 4.10–45; **Microclimatic temp. observation, Danube marsh** (Nestle), 4.10–152.

4.10–234 551.584.3:581.5:551.311.13

Wolfe, John Nicholas (*Dept. of Botany and Plant Pathology, Ohio State Univ., Columbus*), **he possible role of microclimate.** *Ohio Journal of Science,* Columbus, 51(3):134–138, May **951.** 2 figs., table, 11 refs. Abstracted from reprint. **DLC, DWB**—The author suggests he idea of introducing the factor of microclimatic conditions into the study of climate and egetation of the periglacial zone. He shows examples which appear to indicate that certain pecies are found in regions outside their normal sphere of occurrence, which can be explained y influences of the periglacial microclimate. *Subject Headings:* 1. **Glaciation 2. Plant cology 3. Topographic effects.**—*G.T.*

4.10–235 551.584.34:551.524.4:551.554

Hoinkes, H., **Zur Mikrometeorologie der eisnahen Luftschicht.** [On the micrometeorogy of the air layer near the ice.] *Archiv für Meteorologie, Geophysik und Bioklimatologie,*

Ser. B, 4(4):451–458, **1953.** 2 figs., 5 tables, 6 refs. German, English, French summarie p. 451–452. **DWB**—Measurements of wind speed and temperature gradients 18 to 240 cm above ice on Vernagt glacier (2973 m) and Hornkees (2260) in Alps on sunny and overcas days are set out. Both are represented by logarithmic formulas, the constants of which ar used to calculate the austausch coefficient, roughness parameter and turbulent heat transfe from air to ice. Thermal convection does not occur. The results are checked by measure ments of ablation and radiation balance, and agree closely with theoretical values of H. U SVERDRUP and H. LETTAU. *Subject Headings:* **1. Micrometeorology of glaciers 2. Alps.**— *C.E.P.B.*

4.10–236 551.584.43:551.579.2

Thams, J. C., **Eine interessante mikroklimatische Beobachtung.** [An interesting micro climatic observation.] *Leben und Umwelt*, Basel, No. 1:8–13, **1951.** 4 photos. **DWB**— Characteristic features of snow melting around plants are described. *Subject Headings* **1. Microclimatology 2. Snow melt.**—*A.A.*

CLIMATIC CLASSIFICATION

See also: **Rainfall types, Indonesia, W. New Guinea** (Schmidt, Ferguson), 4.10–202; **Biology of deserts** (Cloudsley-Thompson), 4.10–242.

4.10–237 551.585(438

Romer, Eugeniusz, **Regiony klimaticzne Polski.** [Polish climatic regions.] *Wrocławski Towarzystow Naukowe, Prace, Ser. B*, No. 16, **1949.** 26 p. tables, 2 maps (fold.), refs. **DL** —After criticizing the climatic classification of KÖPPEN with its moisture index and DE MARTONNE'S aridity index, the author introduces his own system of regional classification o climate based on the concept of climatic gradients and isogradients. The plotting of climati isogradients on the basis of 1600 figures of available climatic data for a long period on a 1:1,000,000 map of Poland resulted in a map of climatic regions which is analogous to the grad ient map and shows the existence of 10 types of climate (7 of Atlantic origin, one easterly and 2 or 3 stationary types). These 10 types are subdivided into 60 climatic areas covering th whole territory of Poland. *Subject Headings:* **1. Climatic regions 2. Climatic classificatio 3. Poland.**—*A.M.P.*

4.10–238 551.585.5

Wayland, E. J., **More about the Kalahari.** *Geographical Journal*, 199(1):49–56, March **1953. DWB**—Criticisms of account of Prof. DEBENHAM in "Geology of South Africa," 2nd ed. 1939, describing penetration and flow off of rainfall, peculiar hydrology of the deser sands, wind-eroded pans and brief references to climatic history. *Subject Headings:* **1. Deserts 2. Kalahari Desert, Bechuanaland.**—*C.E.P.B.*

BIOCLIMATOLOGY

See also: **World atlas of epidemic diseases** (Rodenwaldt), 4.10–10; **Radiation climate, W. Germany** (Scherhag), 4.10–132; **Sunshine duration, Geisenheim, and influence on wine harvest** (Weger), 4.10–133; **Meteoro-bioclimatic nuclei investigations, Mittelgebirge, Baltic coast** (Flach), 4.10–190; **Climate of S. Africa** (Whitmore), 4.10–227.

4.10–239 551.58

Bonacina, Leo C. W., **What are damp heat and damp cold?** *Weather*, 8(2):42–44, Feb **1953.** ref. **MH-BH**—Damp heat (up to 98°F) hinders cooling of body by evaporation damp cold (down to 32°) chills by conduction. *Subject Heading:* **1. Physiological climatology** —*C.E.P.B.*

4.10–240 551.586:519.

Bartels, Julius, **Zur statistischen Methodik.** [On statistical methods.] *Annalen de Meteorologie, Medizin-Meteorologische Hefte*, No. 8:39–43, **1953.** 4 refs. Berg, Hellmut **Statistisch gewonnene Ergebnisse in der Medizin-Meteorologie.** [Statistical results i

edical meteorology.] *Ibid.*, p. 43–51. 2 figs., 2 tables, 34 refs. Hosemann, Hans, **Statistische Methoden und ihre Anwendung, gezeigt an Beispielen aus der Geburtshilfe.** [Statistical methods and their application, illustrated by obstetrics.] *Ibid.*, p. 52–67, 36 figs. **WB**—Bartels gives a general comparison of the application of statistical methods in geophysics and biometeorology. Berg considers that bioclimatic material is often statistically adequate and inexact. Meteorological factors are not single elements but weather complexes. Apparently sound relations of birth, death and specific diseases to passage of fronts e examined and some are confirmed. Hosemann describes statistical methods and illustrates ith numerous examples from birth statistics including relations to time of day, lunar phases d other periodicities. *Subject Headings:* **1. Bioclimatology 2. Statistical analysis. I. Berg, . II. Hosemann, H.**—*C.E.P.B.*

4.10–241 551.586:551.509.21(435)

Seilkopf, Heinrich, **Biosynoptik.** [Biosynoptics.] *Annalen der Meteorologie, Medizin-Meteorologische Hefte*, No. 8:74–83, **1953.** 6 figs., 5 refs. **DWB**—Describes weather summaries r doctors issued at Hamburg and based on upper air and surface synoptic charts, and their e in biometeorological diagnosis. North and south movements of warm and cold air masses d fronts are of special importance. Several notable examples are illustrated by analyzed eather charts and the associated medical effects described. *Subject Headings:* **1. Bioimatology 2. Forecast dissemination 3. Hamburg, Germany.**—*C.E.P.B.*

4.10–242 551.586:551.515

Daubert, Karl, **Biometeorologische Ergebnisse des Tübinger Arbeitskreises.** [Bioeteorological results of the Tübingen working party.] *Annalen der Meteorologie, Medizin-Meteorologische Hefte*, No. 8:83–95, **1953.** 16 figs. Discussion p. 94–95, fig. **DWB**—Weather rocesses are divided into anticyclonic, transitional and cyclonic with 15 subdivisions, and urnal variations compared with statistics of cases of appendicitis, asthma, etc. The special ses of Feb. 23–26 (great solar activity) are discussed in detail. *Subject Headings:* **1. Bioimatology 2. Atmospheric disturbances.**—*C.E.P.B.*

4.10–243 551.586:551.585.53

Cloudsley-Thompson, J. L., **Biology of deserts.** *Nature*, London, 170(4336):951–953, ec. 6, 1952. **DWB**—Report of symposium at Royal Institution, London, Sept. 25–27, 1952. . B. Williams described microclimatic studies near Cairo. Other speakers discussed plant ology, irrigation and mammalian and human physiology in deserts. *Subject Headings:* **Desert bioclimatology. I. C. B. Williams.**—*C.E.P.B.*

4.10–244 551.586:338.97

Wheeler, Raymond H., **Weather and business trends in the U. S. 1794–1950 and throughut history. Pts. 1–4.** *Journal of Human Ecology*, Crystal Lake, Ill., 1(6), **1951.** 59+p. charts, refs. **DWB**—The author correlates booms and depression with weather trends in the nited States from 1794 to the present time and finds that about 75% of boom years are wet d about 75% of depression years are dry. This trend of business and weather is extended ck to 600 B.C. A casual relationship is established between weather and human beavior on the basis of uncritical experimental, observational and theoretical framework of UNTINGTON, Mills, Peterson, etc. The approach of the author is qualitative. *Subject eadings:* **1. Weather effects 2. Human ecology 3. Business cycles.**—*I.L.D.*

4.10–245 551.586:615.8

Lampert, H. and Pirlet, K., **Die physikalisch-diätetische und Klimato-Therapie als usale Konstitutionstherapie und die daraus sich ergebende Forderung nach einer therautisch verwertbaren Konstitutionstypeneinteilung.** [Physical dietetic and climatic therapy causative constitution therapy and the resulting types of constitution evaluated therapeucally.] *Annalen der Meteorologie, Medizin-Meteorologische Hefte*, No. 8:2–4, **1953.** Pirlet, K., **elche Gesichtspunkte sind bei einer Konstitutionstypeneinteilung zu berücksichtigen und elche diagnostischen Möglichkeiten ergeben sich hieraus?** [What points of view are to be

considered in classifying constitutions and what diagnostic possibilities result?] *Ibid.*, 5–11, 8 figs. Rückheim, G., **Über das Grundprinzip der biologischen Reaktion des Menschen** [On the basic principle of human biological reaction.] *Ibid.*, p. 11–15. **DWB**—1) The firs paper argues that biophysical and bioclimatic factors operate differently on healthy men an on patients of two different constitution types. Climatic and therapeutic needs of each of th latter are discussed. 2) CURRY's argument that variations of Aran are the cause of all con stitutional disturbances (i.e., all sickness) is untenable. Meteorological effects are onl indications of the type of constitution. 3) The existence of 2–5 types of constitution reactin differently is discussed and further research recommended. *Subject Headings:* **1. Climate therapy 2. Weather sensitivity. I. Rückheim, G.**—*C.E.P.B.*

4.10–246 551.586:615

*Vogt, Heinrich Wilhelm (*Bad Pyrmont*) and Amelung, Walter (*Königstein, Taunus*) **Einführung in die Balneologie und medizinische Klimatologie. Bäder- und Klimaheilkund** [Introduction to balneology and medical climatology. Balneotherapy and climatic therapy 2nd ed. Berlin, Springer, **1952.** 266 p. 40 tables, 29 figs., bibliog. p. 258–262. **DLC**- The section on climatology contains: 1) a descriptive account of the physics and chemistry o the atmosphere, the properties of the individual meteorological variables of air masses, aerosol atmospheric electricity, weather processes and climatic types; 2) the physiological effec of the individual meteorological variables, heat, balance of the human organism, heat and col injuries, chilling, pathological effects of weather influences, influence of chemical constituent of the atmosphere, diurnal and seasonal periodicity of disease; influence of climate upon th spread of diseases, therapeutic effect of climate upon physiological processes, psychologic effect of climate and artificial climates and 3) utilization of high and moderate altitude climat and marine climates for curative purposes in various chronic diseases. *Subject Heading* **1. Medical climatology 2. Balneology 3. Climatotherapy.**—*I.L.D.*

4.10–247 551.586:615

Zanon, Francesco Saverio (*Dir. d'Osser, Geof. del Seminario Patriarcale di Venezia*) **Il Lido di Venezia e la sua aria.** [The Lido of Venice and its air.] *Geofisica Pura e Applicat* 21:133–141, **1952.** refs., Italian and English summaries p. 133. **DWB**—The geology an geography of the Lido are described, its importance as a health resort is stressed in that nume ous hospitals and sanitariums are located on the Lido, and the various institutions takin meteorological observations are listed. A distinction is made between marine and paramarin air. The microclimate of this area is described in terms of the variations in atmospher temperature, relative humidity, relative salinity and rainfall of the Lido and of the neighborin Poveglia Island, and the therapeutic value of the air is discussed. *Subject Headings:* **1. Seasid resorts 2. Climatology 3. Venice, Italy.**—*I.L.D.*

4.10–248 551.586:61

Humidity brings polio. *Science News Letter*, 61(19):291, May 10, **1952. DWB**—Brie popular review of a study reported by DR. CHARLES ARMSTRONG of the U. S. National Institut of Health to the National Academy of Sciences in Washington (*see* 4.6–223, June 1953, *MAB* It is pointed out that the amount of atmospheric humidity affects the amount of secretion pr duced in the human nose and throat. Secretion is low and sensitivity to polio increases whe the humidity is high. Comparison of humidity records with figures of polio outbreak i Wash., D. C. and Denver, Colo., are claimed to support this hypothesis. *Subject Heading* **1. Humidity effects 2. Epidemics 3. Poliomyelitis. I. Armstrong, Charles.**—*G.T.*

4.10–249 551.586:64

Buettner, Konrad, **Protective clothing for heat and cold.** (In: **German aviation medicin World War II.** Washington, D. C., U. S. Govt. Print. Off., **1950.** v. 2. p. 876–886. 4 figs 3 tables, 12 refs., 15 equations.) **DWB**—The dependence of the insulating property of clothin upon thickness and the coefficient of heat conductivity, the measurement of the coefficient heat conductivity of clothing, the transfer of heat by radiation between layers of clothin the effect of wind and of moisture and humidity upon the insulating effectiveness of clothin

he thickness and design of clothing in relation to insulation, the effect of cold in the water pon heat loss from the body and the characteristics of protective clothing for hot and dry esert climates, are discussed. The discussion is quantitative and equations for calculating he insulating value of clothing are given. *Subject Heading:* **1. Clothing climate.**—*I.L.D.*

UPPER AIR CLIMATOLOGY

4.10–250 551.587(458)

*Flohn, Hermann (*Deut. Wetterdienst, US-Zone*), **Zur Kenntnis des Klimas der freien tmosphäre über Sizilien.** [Knowledge of the climate of the upper atmosphere over Sicily.] *eofisica Pura e Applicata*, Milan, 15(3/4), April/June **1949.** 12 p. 10 tables, 20 refs. Abtracted from reprint. **MH-BH**—Summary of German observations made during the war Oct. 1941–July 1943) up to 20–22 km in Catania (37°28′N, 15°04′E). Averages given for emperature, absolute and relative topographies, wind frequency and velocity. *Subject leadings:* **1. Observational data 2. Upper air climatology 3. Catania, Sicily.**—*A.A.*

MISCELLANEOUS APPLICATIONS

METEORS

See also: **Auroral, meteor and ionospheric back-scatter long duration echoes** (McKinley, Millman), **4.10–33.**

4.10–251 551.590.25

Ceplecha, Zdeněk (*Astronomical Inst. of the Charles Univ., Prague*), **Double photographed neteor, 1949 Apr. 21.** *Prague. Ústřední Ústav Astronomický, Bulletin*, 3(1):13–15, Jan. 31, **952.** fig., 4 tables, 5 refs. **DLC**—The atmospheric logarithmic density gradient was determined from the light curve with the aid of two photographs of one meteor, taken from ifferent places, using a microphotometer. The result is $b = -0.070$ for the height from 95 to 5 km. For the atmospheric density $\log \rho$ (95 km) $= -8.52$, $\log \rho$ (75 km) $= -6.48$. The velocity of the meteor was 35 km. sec^{-1}. *Subject Headings:* **1. Meteor observation . Meteor photography 3. Atmospheric density 4. Upper atmosphere.**—*A.A.*

4.10–252 551.590.25:621.396

Closs, R. L., Clegg, J. A. and Kaiser, T. R. (*Jodrell Bank Experiment Station, Univ. of Manchester*), **An experimental study of radio reflections from meteor trails.** *Philosophical Magazine*, London, Ser. 7, 44(350):313–324, March **1953.** 11 figs., 12 refs. **DWB**—Theoetical predictions of meteor echoes were tested by measurements with transverse and parallel olarization of the echo amplitudes from single meteor trails mainly in Arietid radiant and the heory was confirmed. *Subject Headings:* **1. Meteor trails 2. Reflection echoes.**—*C.E.P.B.*

VISIBILITY

4.10–253 551.591.6:551.593.55:523.82

Tousey, R. and Koomen, M. J. (*Nav. Res. Lab., Wash., D. C.*), **The visibility of stars and lanets during twilight.** *Optical Society of America, Journal*, 43(3):117–183, March **1953.** figs., 3 tables. **DWB**—From known values of twilight sky brightness, atmospheric transission, and eye sensitivity, the visibility of planets and stars of magnitudes −2.5 to +4.5 is alculated for the twilight period. The results of the calculations are given in charts which an be applied to various altitudes of the observer and various conditions of observation. The twilight belt is about 1100 sea miles in width, from the sunset or sunrise meridian to full ight. The charts show that under good conditions in the first 200 miles of the belt the brighter lanets and Sirrus become visible, in the next 200 miles first magnitude stars appear, and eyond 500 miles practically all navigational stars can be seen. *Subject Headings:* **1. Astronomy . Twilight visibility.**—*Authors' abstract.*

OPTICAL PHENOMENA

See also: **Atmos. ozone, relation to meteorological conditions** (Langlo), 4.10–8; **Smoke haze over Isle of Man** (Kearns), 4.10–92; **Visibility of stars and planets during twilight** (Tousey, Koomen), 4.10–253.

4.10–254 551.593.53

Karapiperis, Leonidas N. and Karapiperis, Photios P., **Peri tou kyanou chrōmatos tou ouranour en Athēnais.** [On the blueness of the sky at Athens.] *Akademia Athēnōn, Praktika* 27:211–215, **1952.** 2 tables, 8 refs. In Greek, English summary p. 215. Abstracted from reprint. **MH-BH**—In this paper the change of the blueness of the sky at Athens and the cause of this change are studied according to observations made by Linke's scale at National Observatory of Athens, during the period Aug. 1944 through Feb. 1949. The influence of visibility, absolute humidity, wind and rain on the blueness of the sky is investigated and a modification of the scale is suggested. *Subject Headings:* **1. Sky light color 2. Athens, Greece** —*Authors' abstract.*

4.10–255 551.593.55:551.521.4

*Geo-Science, Inc., **Twilight and airglow study.** Contract AF 19(122)-433, Final Report Feb. 1, **1952.** 19 p. 6 figs., tables. **DWB**—Electrophotometric recordings of zenith twilight and night sky brightness were made at the Washington Grove Station (39°08′N, 77°11′W). The hourly values of night sky brightness are given from Nov. 1, 1951 to Jan. 31, 1952. Graphs demonstrate the reduction of the zenith brightness to full moon for clear and cloudy nights. The average zenith brightness is greater on cloudy moonlight nights than on clear moonlight nights. *Subject Headings:* **1. Twilight 2. Light of the night sky 3. Washington D. C. I. MacKenzie, Merlin H. II. Contract AF 19(122)-433.**—*A.A.*

4.10–256 551.593.61:535.2

Lander, Richard L. and Nielsen, Carl E. (*Ohio State Univ., Columbus, Ohio*), **Scattering of light from small drops.** *Review of Scientific Instruments*, 24(1):20–22, Jan. **1953.** 4 figs., refs. **DWB**—Curves are given for the angular distribution of light scattered from drops of radius 1.4×10^{-3} cm and 4.8×10^{-4} cm for angles from 28° to 147°. The distribution is more nearly symmetrical than had been speculated and depends strongly on the drop size. The intensity of the scattered light was measured with a phototube circuit and galvanometer. The drops were produced in a downward diffusion chamber. *Subject Headings:* **1. Fog bows 2. Photometry.**—*Authors' abstract.*

4.10–257 551.593.65

*Grishin, N. I., **Serebristye oblaka v 1950–1951 gg.** [Noctilucent clouds in 1950–1951.] *Meteorologiia i Gidrologiia*, No. 8:22–26, **1952.** 2 figs., table, 11 refs. **DLC**—Systematic observations of noctilucent clouds during 1950–1951 were made in European Russia by the Moscow division of the All-Union Astrogeodetic Society. Summary of the observational data is presented in table which shows that 2 cases were recorded in 1950 and 21 cases in 1951. These clouds were observed at different azimuths on a background of twilight sky. Increase of brightness of the twilight segment before appearance of clouds and after their disappearance and darkening of the sky area below the cloud zone were recorded many times during the observation periods. The observations confirmed that the appearance of clouds is possible when the sun is 5°–14° below the horizon. The popular opinion that the noctilucent clouds are observed only in narrow strips at 50°–65° north and south latitudes has not been disproved. I. S. Astapovich watched the twilight sky during 700 evenings of 1942–1945 at Ashkhabad (37°56′N) and not one case of noctilucent clouds was registered. *Subject Headings:* **1. Noctilucent cloud data 2. European U.S.S.R.**—*N.T.Z.*

ELECTRICAL PHENOMENA

See also: **I.U.G.G. Oslo meeting, Aug. 1949**, 4.10–6; **Auroral, meteor and ionospheric back-scatter long duration echoes** (McKinley, Millman), 4.10–33; **Frontal precipitation and lightning observed by radar** (Marshall), 4.10–34; **Radioactive dust from nuclear detonations** (Eisenbud), 4.10–90; **Causes of excessive absorption in ionosphere on winter days** (Dieminger), 4.10–100; **Sudden radio fadeouts on frequency near 2 Mc/sec** (Findlay), 4.10–102; **Phase and group paths of radio waves returned from E region of ionosphere** (Findlay), 4.10–103; **Long-delay ionospheric echoes at 150 kc/s** (Gibbons, Schrag, Waynyck), 4.10–108; **Diffraction of galactic radio waves as method of investigating irregular structure of ionosphere** (Hewish), 4.10–110.

4.10–258 551.594.13

Chalmers, J. Alan, **Atmospheric electrical conductivity near the earth's surface.** *Journal Atmospheric and Terrestrial Physics*, 3(4):223–224, May **1953.** 7 refs., 3 eqs. **DWB**—screpancies between measurements of polar conductivities of the atmosphere at ground level d 1 m by G. A. O'Donnell (1951–52) and A. R. Hogg (1939) are attributed to the fact that Donnell's apparatus was set up under a large tree and results are not applicable to current d field measurements. *Subject Heading:* **1. Electrical conductivity of air.**—*C.E.P.B.*

4.10–259 551.594.13:550.38

Hasegawa, Mankichi and Maeda, Hiroshi (*Geophy. Inst. Kyoto Univ.*), **A suggestion for e electric conductivity of the upper atmosphere from an analysis of diurnal variations of rrestrial magnetism (II).** *Japan. Science Council. Ionospheric Research Committee, Report Ionosphere in Japan*, 5(4):167–178, **1951.** 7 figs., 2 refs., 5 eqs. **DWB**—The diurnal riations of geomagnetism (Sq) are caused by variations of the electric field and those of ectric conductivity. The semidiurnal variation in the analyzed electric field is small com- red with that in Sq. The diurnal variation of conductivity in the N–S direction is very kely greater than that in the E–W direction. *Subject Headings:* **1. Electrical conductivity air 2. Diurnal geomagnetic variations.**—*A.A.*

4.10–260 551.594.14

Sittkus, A., Ganz, D. and Remy, E., **Untersuchungen über die radioaktive Umgebungs- rahlung und ihre Wirkung.** [Investigations into radioactive radiation from surroundings d its effect.] *Zeitschrift für Naturforschung*, 8a(5):317–322, May **1953.** 4 figs., table, 11 fs. **DLC**—An investigation of influence of effect of nearby radioactive radiation on measure- ents with ionization chambers and simple counters showed that variations of ground and air diation could change zero of unprotected apparatus by 100%, and behind 50 g/cm² shield by %. Effect was due mainly to new snow and rain water. *Subject Heading:* **1. Radioactivity the atmosphere.**—*C.E.P.B.*

4.10–261 551.594.22

Wait, George R., **Electric charge carried to ground through thunderstorms.** (In: **hunderstorm electricity.** Chicago, University, Dept. of Meteorology, Oct. **1950.** p. 191–5. 6 figs.) **DWB**—A brief report of measurements of electric current passing vertically rough a thunderstorm, made with a B-29 airplane equipped with a conductivity apparatus d Gunn type electric field meters. The thunderstorms were bipolar, the resultant current nsferred negative charge to the ground, the current per storm varied from 0.1 to 6 amperes d neither the positive nor negative conductivity is altered appreciably by strong electric lds over a thunderstorm. *Subject Headings:* **1. Electrical conductivity of air 2. Electrical scharges 3. Thunderstorm electricity.**—*I.L.D.*

4.10–262 551.594.221

Baskin, Donald (*FPO, N. Y.*), **Lightning without clouds.** *American Meteorological ciety, Bulletin*, 33(8):348, Oct. **1952. MH-BH**—An account of an aircraft struck by lightning der clear sky conditions with complete absence of clouds. The position of the aircraft s 08°55′N, 79°57′W; the elevation was 5000 ft and the date of occurrence July 21, 1952 at 15 p.m. *Subject Heading:* **1. Lightning from clear sky.**—*I.L.D.*

4.10–263 551.594.221:53

Knuckles, C. F. (*McDonald Obs., Fort Davis, Tex.*) and Swensson, J. W. (*Astrophys. Liége, Belgium*). **The spectrum of lightning in the region λ6 159–λ7 157.** *Annales de physique*, 8(3):333–334, **1952.** table, 8 refs. French summary p. 333. **MH-BH**— spectrum of lightning in the red region has been analyzed by means of two spectrogram excellent quality. A list of wave lengths and of identifications is presented for the band the region λ6159–λ7157. In this spectral range, apart from the band Hα, all bands found to be due to O I, N I, and N II. Attention is called to the exceptional relative weak of the band λ6453, due to neutral oxygen. *Subject Heading:* **1. Lightning spectrum.**—*Auth abstract.*

4.10–264 551.594.221:551.521.61:53

Saskatchewan. University. Physics Dept., **The near infrared spectrum of lightn** Contract AF 19(122)-152, Scientific Report, No. AR-6, Dec. **1951.** 4 p. plate. **DW** Clearly defined spectral photographs of argon, of lightning and of condensed air discha are shown in relation to each other. The lightning spectrum (7100–9100 Å) was obtained Sept. 18, 1951 at Saskatoon, with an auroral spectrograph, and was the result of many lightn flashes over a period of one hour. The other two spectra were obtained with a grating ins ment having twice the dispersion of the auroral spectrograph, but the 3 prints were remark well matched. The wave lengths and identifications are tabulated. All radiations are f neutral atoms. This is the first identification of argon lines in the spectrum of the atmosp above the earth's surface. *Subject Headings:* **1. Argon 2. Infrared spectra 3. Lightn spectrum. I. Contract AF 19(122)-152 II. Petrie, William III. Small, R.**—*M.R.*

4.10–265 551.59

Vegard, L. (*Physical Inst., Univ. Oslo*), **Recent advances in auroral spectroscopy and in knowledge of the upper atmosphere.** *Annales de Géophysique*, 8(1):91–99, Jan./March 1 .3 tables, 17 refs. French summary p. 91. **DWB**—The author refers to earlier papers in w he reported the existence of H-lines in the auroral spectrum. In further pursuit of his vestigation he has installed a double-prism spectrograph at the Auroral Observatory at Tro The instrument, designed by the author, was constructed by Société Générale Optique. obtained with the instrument are briefly summed up and discussed. They appear to indi the usefulness of the apparatus in auroral studies and in temperature determinations. *Su Headings:* **1. Auroral spectroscopy 2. Spectrographs.**—*G.T.*

4.10–266 551.594.51:551.50

*Vegard, Lars and Tønsberg, Einar. **Results from auroral spectrograms obtained Tromsø during the winter 1950–51.** *Geofysiske Publikasjoner*, Oslo, 18(8), **1952.** 2 4 figs., 3 tables, 28 refs., 3 plates, eqs. **DLC**—Includes an extensive table comparing the w lengths previously measured with those from more recent spectrograms obtained at the Au Observatory at Tromsø in 1950 with an improved spectrograph which has a much higher power. Discusses the Doppler displacement of auroral hydrogen lines. On spectrogr here reproduced, Hβ appears quite strong and with Doppler effect in one case, and less stro another. Measurements of ionosphere temperature, based on the negative nitrogen b 3914(1) and 4278(2), gave −56°C. Spectrograms obtained at Tromsø during the winte 1950–51 and at Oslo in Feb. 1950 are reproduced. *Subject Headings:* **1. Auroral spe 2. Doppler displacement of auroral hydrogen lines 3. Ionospheric temperature 4. Au instruments.**—*M.L.R.*

4.10–267 551.594.7:53

Brandejs, Stanislav, **Tabulky pro výpočet indexu lomu vzduchu v oboru ultrakrátk radiovln.** [Table for calculating the air refractive index in the ultrashort radio wave ra *Meteorologické Zprávy*, 4(5–6):107–108, **1950.** table, 3 refs., 8 eqs. In Czech. **MH-B** Equations developed by H. G. Brokker, A. Friend and A. Perlat are explained and a t for calculating the air refraction (dielectric constant) from temperature, pressure and humi presented. For a more detailed study of the subject the author refer to his article on

nal propagation of ultrashort radio waves published in *Meteorologické Zprávy*, 1947, p. 105. *ject Headings:* **1. Dielectric constants 2. Computation tables 3. Short wave radio propaga-**.—*G.T.*

4.10–268 551.594.7:621.396.029.6

Vysokovskiĭ, D. M., **Rasseivanie i pogloshchenie mikroradiovoln v atmosfernykh obra-niiakh (dozhd', sneg, oblachnost', tuman) i radiolokatsiia.** [Scattering and absorption icroradio-waves in atmospheric formations (rain, snow, cloudiness, fog) and radio location.] *ekhi Fizicheskikh Nauk*, Moscow, 47(3):389–444, July **1952.** 15 figs., 9 tables, 32 refs., eqs. **DLC**—A highly theoretical paper in which the author presents a survey of the main lts of theoretical and experimental investigations of the scattering and absorption of roradio by macroscopic particles of spheric form and on the application of radiolocation for study of atmospheric formations. The author takes up successively the following ques-s: 1) the theory of scattering and absorption of microradio waves by spherical particles; ne amplitude of scattering a_n^s and b_n^s; 3) the fading of microradio waves on suspension of erical water drops in the atmosphere; 4) a scattering of microradio waves by spherical water ps; 5) reverse (radio-locational) scattering; 6) some physical data on atmospheric forma-s; 7) the theory of radio-location of atmospheric formations; 8) methods and results of an stigation of atmospheric formations by means of radio-location. *Subject Headings:* **Microwave scattering 2. Microwave absorption 3. Hydrometeors.**—*A.M.P.*

PART II. SELECTIVE ANNOTATED BIBLIOGRAPHY ON AURORAS

By: *Mary L. Rice* and *Malcolm Rigby*

EXPLANATORY NOTE

An exhaustive bibliography on auroras would comprise at least 10,000 items if all references individual occurrences were included. Eliminating all but the most important of the latter typ we still find several thousand references of which about a thousand have been selected for inclusi in a series of bibliographies.

In this issue we have included as many items as we have been able to locate during the pa two years on the **General** and **Descriptive** aspects of auroral observation and theory. The followi Outline of Contents indicates the scope and details of the subject and geographical coverage. general, we have included textbooks, catalogs, bibliographies, symposia, atlases, statistical compil tions of distribution, height, forms, periodicity, etc.; articles describing extensive or unusual occu rences; major theoretical treatises and review articles.

In subsequent issues the vast material accumulated on **Auroral Physics, Auroral Spectroscop Light of the Night Sky (airglow) Spectra** and on the **Photochemical (ionization-deionization) Pro esses in the Upper Atmosphere** will be organized and published. Incidentally, numerous referenc to literature on twilight phenomena, noctilucent or irridescent clouds, green flash, etc. have be accumulated for future reference.

The fact that references to mysterious celestial manifestations which were often obvious auroral displays, are contained in the scriptures, chronicles and astrological manuscripts from biblic to modern times, is well known. More accurate, if not completely scientific accounts, have be handed down to us by ARISTOTELES (4J–1) and other Greek, Roman, Arabic and German write (*see* MAIRAN, HELLMANN, etc.). The first use of the term Aurora Borealis is credited to P. GASSEN the famous French philosopher-astronomer-epicurean, who uses it in his textbook on physics (164 HALLEY (4J–2) suggested in 1716 a method for synchronous observation of prominent auro features at 2 distant stations to determine accurately the height of these features. The first actu estimates of the height were made by MAIRAN (4J–3) in 1726 and the first accurate and controll measurements made by triangulation are credited to CAVENDISH in 1790 (4J–5). The seve theories which were propounded from 1708 to 1900 did not show much improvement over that MAIRAN, advanced in 1731 (4J–4). He also succeeded in bringing to light a report of a sea capta (1745) which gave first evidence of the **Aurora Australis** (which term up to that time had been us in the Northern Hemisphere for auroras observed south of the zenith). Theories have varied fro those having to do with reflection from ice (VALERIUS), or emanations from the earth or volcanoes those attributed to magnetic, electrical, corpuscular or electromagnetic sources.

Catalogs of auroras since antiquity and dissertations on their cause, distribution, etc. appear in the early 18th century. The first such is evidently a thesis for a doctorate at Uppsala, Swede presented in June 1708 by HARALD VALLERII (Valerius) in his 62nd year (*see* HELLMANN 4J-24 MAIRAN in 1732 had a few catalogs and by 1754 numerous ones which he integrated in his seco edition (4J–4). Textbooks have been rare—those of FRITZ (4J–19), ANGOT (4J–28), NIPPOL (4J–244), VEGARD (4J–64) and HARANG (4J–206) being the most outstanding.

Recently, conferences on the aurora or auroral physics have been the vogue. One w held in Oxford in 1949, in State College, Penna. in 1949 and 1950, in Toronto in 1951 and at t meetings of the International Association of Terrestrial Magnetism and Electricity (IATME) Oslo (1948) and Brussels (1951). The proceedings of these conferences occupy large volumes ea containing dozens of papers, usually on very specialized aspects of auroral theory, physics or spe troscopy, which will be found in the second or third of these bibliographies.

OUTLINE OF CONTENTS

AURORAL RESEARCH, 4J–66, –111, –162, –188 to –190, –195, –198, –199, –201

AURORAL DESCRIPTIONS, 4J–9, –22, –27, –34, –41, –43, –44, –47, –53, –54, –57, –123, –127, –182, –185, –222

Classification, 4J–122, –192, –230

Forms, 4J–4, –6, –11, –21, –24, –28, –64, –7 –82, –87, –100, –103, –105, –113, –11 –119, –126, –144, –153, –154, –15 –157, –176, –206, –209, –217, –239

Diurnal variation of auroral forms, 4J–

Auroral arcs, 4J–3, –24, –81, –202, –219, –224
Auroral curtains, 4J–48
Auroral rays, 4J–33, –50, –68, –69
Auroral streamers, 4J–181, –219
Homogeneous arcs, 4J–156
istribution
Geographic, 4J–4, –19, –20, –31, –53, –114, –115, –122, –136, –143, –144, –154, –165, –192, –205, –206, –217, –230
Aurora australis, 4J–4, –17, –31, –35, –40, –51, –57, –73, –108, –112, –136, –142, –147, –165, –168, –182, –185, –191, –196, –204, –234
Low latitude auroras, 4J–119, –120, –122, –124, –126, –139
requency, 4J–18, –19, –31, –35, –36, –53, –62, –68, –130, –142, –162, –191, –193, –197, –198, –204 to –206, –223, –234, –239, –243
Diurnal frequency, 4J–35, –91, –145, –146
Monthly frequency, 4J–149
eight, 4J–4, –5, –7, –12, –19, –21, –24, –27, –28, –30, –31, –44, –47, –50, –54, –64, –69, –72, –74, –76, –78 to –81, –92 to –94, –98 to –100, –102, –103, –105, –106, –110 to –114, –122, –128, –129, –132, –136, –137, –141, –144, –163, –181, –189, –192, –206, –217, –230
Low altitude auroras, 4J–70 to –72, –80, –81, –89, –92 to –94, –99, –153, –230
ntensity, 4J–4, –8, –11, –21, –24, –28, –36, –47, –51, –56, –83, –103, –122, –140, –154, –155, –170, –202, –227, –230
udibility, 4J–4, –23, –24, –28, –52, –67, –70, –89, –92, –93, –99, –105, –128, –154, –230
uroral coloration, 4J–4, 4J–118, –127, –141
osition in space, 4J–4, –12, –21, –45, –47, –50, –54, –59, –63, –73, –102, –113, –136, –146, –156, –186, –225
Orientation, 4J–4, –47, –59, –63, –64, –157, –164, –182, –217, –226
escription of specific and unusual auroras occurring on:
March 6, 1716, 4J–1
March 17, 1716, 4J–241
March 1, 1721, 4J–240
Sept. 26, 1726, 4J–3
Oct. 19, 1726, 4J–3
Feb. 23, 1784, 4J–5
March 29, 1826, 4J–7
Sept. 24, 1870, 4J–11, –12
Oct. 24, 1870, 4J–12
Nov. 16, 1871, 4J–13
Feb. 4–5, 1872, 4J–15, –16
April 1–2, 1873, 4J–15
Feb. 4, 1878, 4J–16
Sept. 10, 1898, 4J–41
April 22, 1915, 4J–43
May 13, 1920, 4J–50
Sept. 1–2, 1921, 4J–48
Oct. 15, 1926, 4J–56
Jan. 25–26, 1938, 4J–118 to –122, –124 to –126, –128, –131, –172
May 11–12, 1938, 4J–127
March 25–28, 1946, 4J–185
March 29, 1946, 4J–188
Sept. 28–29, 1946, 4J–171
Aug. 19, 1950, 4J–126
Oct. 28, 1951, 4J–212

AURORAL DATA, 4J–4, –21, –27, –39, –49, –59, –65, –73, –86, –159, –160, –179, –182, –186
Diurnal frequency, 4J–29, –45, –51, –64, –111, –138, –146
Monthly frequency, 4J–29, –37, –64, –96, –208
Annual frequency, 4J–37, –64, –166
Height, 4J–129, –133, –134
Height distribution of auroral forms, 4J–47, –54, –55, –58, –76, –102, –106, –111, –153
Height frequency of auroral forms, 4J–46, –82, –110, –133, –157, –182
Auroral periodicity, 4J–4, –10, –19, –28, –35, –59, –179, –222
Diurnal, 4J–19, –154
26-day, 4J–26, –32, –156
27-day, 4J–154, –230
27.3-day, 4J–135
28-day, 4J–36, –156
Seasonal (Annual), 4J–4, –6, –19, –38, –154
11-year, 4J–19, –31, –38, –154, –194, –230
56-year, 4J–154
700-year, 4J–222
Secular, 4J–19, –38

MEASUREMENTS AND INSTRUMENTS
Intensity, 4J–51, –73, –115, –170, –178
Height, 4J–30, –76, –115
Methods of measurement, 4J–103, –144, –154, –170
Photography, 4J–34, –46, –54, –63, –66, –84, –95, –98, –107, –113, –132, –136, –144, –174, –194, –206
Reduction of pairs of auroral plates, 4J–95, –206
Single station photography, 4J–63, –84, –134, –164
Double station photography, 4J–54, –95, –102, –132, –146, –162, –188
Parallactic observation (Triangulation), 4J–2, –5, –6, –7, –27, –47, –82, –247
Visual observation, 4J–74, –134, –209, –226
Auroral detection by radio and radar, 4J–78, –169, –187, –203, –229, –231, –232
Instruments
Photoelectric meters, 4J–83
Recording instruments (photometers), 4J–83, –140, –178, –218
Spectrographs, 4J–188, –246
Spectrometers, 4J–233

PHYSICS OF AURORA (bulk of material reserved for later bibliography)
Experimental auroras, 4J–42, –64, –85
Geomagnetic relationships, 4J–4, –6, –19, –51, –53, –64, –71, –91, –101 to –105, –109, –119, –120, –122, –125, –126, –138, –139, –144,

–145, –152, –154, –159, –164, –172, –188, –192, –206, –207, –212, –215, –218, –220, –230, –239, –244
Solar relationships, 4J–4, –10, –19, –26, –32, –53, –105, –122, –125, –139, –152, –154, –156, –179, –186, –192 to –194, –204, –207, –230, –243
Sunlit aurora, 4J–55, –100, –107, –113, –117, –136, –141, –148, –151, –153, –181, –182, –230
Lunar relationships, 4J–6, –19, –32, –157
Weather relationships, 4J–6, –8, –19, –171
Ionospheric relationships, 4J–103, –154
Spectra, 4J–21, –24, –64, –103, –105, –114, –115, –117, –128, –129, –141, –144, –154, –189, –206, –215 to –217, –221, –230, –239, –245
Ionization and deionization, 4J–71, –218
Ring current, 4J–85, –144, –215, –230

Auroral Theories, 4J–1, –16, –28, –47, –49, –53, –60, –61, –64, –78, –85, –87, –114, –115, –122, –144, –192, –215, –219, –24 –245
Corpuscular, 4J–42, –87, –144, –206, –230
Electrical 4J–6, –28
Magnetic, 4J–2, –21, –28, –62
Radiation, 4J–60, –61, –64, –144, –230
Torus space, 4J–78, –85
Zodiacal light, 4J–4
Theories of:
Alfvén, 4J–221, –230
Birkeland, 4J–42, –53, –114
Birkeland-Störmer, 4J–85, –144, –230
Brüche, 4J–85, –114
Chapman-Ferraro, 4J–114, –144, –215, –22 –230
Halley, 4J–2
Hulburt, 4J–60, –61, –144, –230
Leutermann, 4J–240
Mairan, 4J–4
Martyn, 4J–221, –230
Störmer, 4J–53, –78, –114, –230

FORM OF WORK

Bibliographies, 4J–144, –177, –210, –245
Periodicals, 4J–161, –235, –236
Atlases, 4J–209
Textbooks, 4J–19, –28, –64, –144, –184, –206, –221, –244, –245
Symposia, Conferences, Colloquiums, etc., 4J–173, –175, –190, –199, –214, –215, –238
History, 4J–241
Catalogs, 4J–4, –6, –10, –14, –17, –20, –22, –2 –25, –27, –28, –37, –41, –49, –96, –147, –14 –152, –154, –185
Chronologies, 4J–242
Photographs, 4J–65

GEOGRAPHICAL OUTLINE

Northern Hemisphere, 4J–75, –159
Southern Hemisphere, 4J–31, –75, –159
Polar Regions
Arctic, 4J–59, –116, –130, –138
Central Arctic, 4J–145
North America, 4J–204
Alaska, 4J–20, –67, –70, –169
College, 4J–111, –200
Canada, 4J–20, –185
Alberta
Edmonton, 4J–155
Viking, 4J–43
Canadian Arctic, 4J–70, –89, –146
Gjøahavn, 4J–86
King Point, 4J–86
Lady Franklin Bay, 4J–25
Meanook, 4J–156, –160
Labrador, 4J–14
North West Territory
Fort Rae, 4J–26
Saskatchewan
Saskatoon, 4J–133, –140, –186, –224
Greenland, 4–38, –178
Northeast Greenland, 4J–194
Scoresby Sound, 4J–91
United States, 4J–20
Connecticut
Hartford, 4J–98
Massachusetts
Blue Hill, 4J–152
Michigan, 4J–74
New Hampshire
Silver Lake, 4J–48
New York
Ithaca, 4J–162, –187, –201
Wisconsin
Yerkes Observatory, Williams Bay, 4J–
Europe, 4J–1, –3, –12
Austria, 4J–211
Belgium, 4J–122
British Isles, 4J–143, –171, –206, –222
England, 4J–5, –7, –8, –118, –119, –12 –168, –209
Cumberland, 4J–192
Essex, 4J–77
London, 4J–29
Shawbury, 4J–223
Sunderland, 4J–36
Scotland, 4J–7, –123, –135
Bornton, 4J–132
Eskdalemuir, 4J–108
Shetland Islands
Lerwick Observatory, 4J–68
Wales, 4J–11
Denmark, 4J–18

Germany, 4J–2, –3
Berlin, 4J–149
Leipzig, 4J–158
Potsdam, 4J–62
Greece, 4J–126
Hungary, 4J–120
Iceland, 4J–38
Akureyi, 4J–44
Italy, 4J–124
Netherlands, 4J–154
Norway, 4J–18, –23, –47, –54, –56, –58, –62, –69, –70, –100, –102, –153, –175, –180, –181, –194
Alten, 4J–93
Bossekop, 4J–26, –33, –46, –49
Haldde Observatory, 4J–105
Kotokeino, 4J–27
Southern Norway, 4J–117, –128, –129, –141
Store Korsnes, 4J–49
Tromsø, 4J–80, –82, –150, –157
Scandinavia, 4J–37
Spitsbergen
Cape Thorsden, 4J–24
Sweden, 4J–18, –22
Abisko, 4J–71, –96
Uppsala, 4J–24
Switzerland, 4J–189
U.S.S.R., 4J–139, –183
Arctic, 4J–130, –138
Crimea, 4J–139

ASIA
Asiatic U.S.S.R.
Kemerova District, Siberia, 4J–170
India, 4J–227
Japan, 4J–209, –221
AFRICA
Grahamstown, South Africa, 4J–40
AUSTRALASIA
Australia
Canberra, 4J–125
Tasmania, 4J–203
New Zealand, 4J–112, –147, –195, –203
Canterbury, 4J–184
Ophir, 4J–57
South Island, 4J–57
ANTARCTICA, 4J–35, –39, –116, –142, –167
Cape Adare, 4J–51
Cape Evans, 4J–51
Little America, 4J–73, –104
Ross Island
Cape Royds, 4J–45
OCEANS, SEAS and ISLANDS
Arctic Ocean
Franz Joseph Land, 4J–34
Kara Sea, 4J–166
Chuckchee Sea, 4J–65
Mediterranean Sea, 4J–131
North Atlantic Ocean, 4J–131
South Pacific Ocean, 4J–107

BIBLIOGRAPHY ON AURORAS

334 B.C.

4J–1 551.594.5

Aristoteles, **Meteorologica.** [ca. 334 B.C.] Original text and English translation by H. D. P. . Cambridge, Mass., Harvard Univ. Press, **1952.** 432 p. map (fold.), diagrs., bibliog. p. VIII–XXX. **DLC**—In the brief chapter on the aurora (p. 34–39) ARISTOTLE describes and tries explain the aurora as being produced by condensation and combustion of the upper air thus ducing "torches," "chasms" and "trenches." Various colors (sometimes blood red) were thought e caused by difference in reflection and refraction of light through air of differing density. The f duration of the "torches," etc. was said to be due to the brief duration of the condensation. *ject Headings:* **1. Auroras. I. Lee, H. D. P.** (*trans.*).—*M.R.*

1716

4J–2 551.594.5(4)

Halley, Edmund, **An account of the late surprising appearance of the lights seen in the air, on 6th of March last; with an attempt to explain the principal phenomena thereof.** *Royal Society London, Philosophical Transactions,* 29(347):406–428, Jan./March **1716. DLC.** Also in: *Royal iety of London, Philosophical Transactions, Abridged,* 6:213–226, **1713–1723** (pub. 1809). **DLC**— er a detailed description of the Great Aurora of March 6, 1716 (O.S.) which was observed by author and others in various parts of Europe (Ireland to Russia) and said to be the most vivid ce 1574, the author suggests a method for determining the height and extent by setting clocks for parent London time and taking the angle and azimuth of some easily marked feature at every ir and half hour to serve as a basis for triangulation from distant stations. He then theorizes the origin, concluding that it is due to a self luminous magnetic vapor emanating from the ground l oriented with respect to the N. magnetic pole and the declination of the compass (for any en place). He attributes the rose color to the beams occasionally reaching a height where they ome lighted by the sun, notes the E–W motion, the apparent maximum frequency at the equinoxes l the fact that the corona is caused by an optical illusion. *Subject Headings:* **1. Auroral theories Aurora of March 6, 1716 3. Europe.**—*M.R.*

1726

4J–3 551.594.5

Mairan, Jean-Jacques Dortous de, **Description de l'aurore boréale du 26. Septembre, & celle du 19. Octobre. Observées au château de Breuillepont, village entre Pacy & Ivry, Diocè d'Evreaux.** [Description of the aurora borealis of Sept. 26 and that of Oct. 19. Observed at t chateau of Breuillepont, village between Pacy and Ivry, diocese of Evreaux.] *Académie des Scienc Paris, Mémoires,* **1726** (pub. 1753). p. 198–215. 3 figs. (fold.) after p. 216. **DLC**—A detail description of the great auroras of Sept. 26 and Oct. 19, 1726, together with accurate drawings various aspects of these displays which were seen all over Europe from Moscow and St. Petersbu to Rome, Naples, Madrid and Lisbon and were remarkably colored and extensive in France. T author estimates the height of the lowest border of the Oct. 19 aurora as >50 leagues (130 km) a the heights of the center of the corona as >70 leagues (180 km), based on angle of observed featu at Paris and other nearby places (not coordinated for time, however). He also concludes that t aurora is within our atmosphere and not outside of it. *Subject Headings:* **1. Auroral height estima 2. Aurora of Oct. 19, 1726 3. Europe.**—*M.R.*

1731

4J–4 551.59

Mairan, Jean-Jacques Dortous de, **Traité physique et historique de l'aurore boréale.** [Physi and historical treatise on the aurora borealis.] *Académie des Sciences, Paris, Mémoires,* **1731** (pu 1733). 281 p. 30 figs., refs. **DLC.** 2nd ed. rev. and enl. Paris, **1754. DLC**—The first editi of this famous work comprises the first systematic coverage of all of the knowledge of the aurora that date. The second edition contains much additional information and statistics on auro gained through extensive correspondence and continuous observations by the author during t 20 intervening years. The 34 chapters of the original work cover the cause, distribution, heig periodicity, orientation, types, succession of types, intensity, pulsations, motions, density, tra parency, colors, and the relation to sunspots, atmospheric electricity, magnetic phenomena, e One of the most substantial contributions was a catalog of 229 auroras observed from the 6th centu to 1731, and tabulated by months and epochs. This was supplemented in the second edition including observations for the next 20 years and other catalogs such as those of FROBÉS, DELIS (St. Petersburg), SHORT, ZANATTI (Bologna), WEIDLER (Saxony), CELSIUS (Sweden), KIRCH a those reported in the *Phil. Trans. of Royal Society of London,* making a total of 1441 days with 17 auroras in all. The seasonal variation is shown clearly (maximum in March and Oct.), and t annual variation (none in many years to 116 in 1730 and 100 in 1732). The ratio of the numb observed two months before or after perihelia and aphelia, respectively, is 558: 173, indicating orbital relationship. The lack of any observations of the aurora australis noted in the 1st ed. v attributed to lack of permanent settlements and to excessive cloudiness at sea in S. Hemisphere high latitudes. Later correspondence uncovered proof of southern aurora by an observation o ship's captain, Antonio de Ulloa, in March 1745, while rounding Cape Horn. Auroral forms illustrated by beautiful drawings of actual displays, and forms are described as quiet arcs, colum jets, horizontal glows, rays, beams, coronas and grand auroras (covering whole sky). Colors ported ranging from white to yellow, orange, brown or red, were said to be caused by refract of light by the upper atmosphere. No noise was ever heard by the author or his scientific coll orators in >20 years of continuous observation in spite of the great "fracas" going on during act displays (due, he thought, to great height and rarity of air in auroral layer). Heights were calcula from numerous simultaneous reports over various parts of Europe, and were usually between and 200 leagues (250–500 mi). The great heights were probably due to failure to allow for g graphical extent of the same arc or display. The theory that the author advanced for the ori of the aurora was unique, for he attributed it to the zodiacal light which was said to be an extens of the solar atmosphere such as is seen at times of eclipse. This solar atmosphere occasiona strikes the rare upper atmosphere of the earth and ignites or illuminates it. The polarity thought to be due to the greater density of the atmosphere in polar regions and to the rotation of earth. Magnetic or electrical phenomena were said to *be caused* by the aurora, not be the *caus* the aurora as HALLEY and others had suggested. Another interesting deduction was that atmosphere consisted of 3 layers—the "Auroral Zone" from 80 km (20 leagues) to 1000 or more k the layer which controls the barometric pressure or the "Middle Region" which extends from 80 down to 10 or 12 km, and the "Lower Layer" which is the region where all the storms, hydrometeo etc. occur (from surface to 10–12 km). Finally, the relationship to sunspots was tested but fou to be inconsistent—in some years of sunspot maximum no aurora were seen while in others numer auroras were observed. *Subject Headings:* **1. Auroral catalogs 2. Auroral heights 3. Aurora a tralis 4. Auroral audibility 5. Auroral theories 6. Auroral coloration.**—*M.R.*

1790

4J–5 551.594.5(42)

Cavendish, Henry, **On the height of a luminous arch that was seen Feb. 23, 1784.** *Royal ociety of London, Philosophical Transactions*, 80:101–105, **1790.** refs. **DLC.** Also in: *Royal ociety of London, Philosophical Transactions, Abridged*, 16:645–647, **1785–1790** (pub. 1809). **DLC**—leight of auroral arch determined from parallactic observations at Kimbolton and Cambridge, ng. which are 12.8 miles apart, was 61¼ geographical miles or 71 statute miles (possibly 52 statute iles if errors are allowed). This is the first known calculation of heights by using prearranged bservations of astronomers at various places, and its accuracy is remarkable considering lack of elephonic communication. *Subject Headings:* **1. Aurora of Feb. 23, 1784 2. Auroral heights . England.**—*M.R.*

1793

4J–6 551.594.5

Dalton, John, **Meteorological observations and essays.** London, W. Richardson, etc., **1793.** 74 p. figs., tables. **DLC**—Sec. 11 (p. 54–60) entitled "Account of the aurora borealis seen at Kendal and Keswick" lists 250 auroras, their time, age of moon and character, as observed during the year period May 1786–May 1793, by the author and his friend Mr. CROSSTHWAITE. Further etails on auroras in 1792–3 are found on p. 65–75, including calculations based on parallactic ob-ervations at two places 22 mi apart indicating that the height of an arch on Feb. 15, 1793 was 150 iles with a probable error of ±1° or perhaps 2° which would give the lower probable limit as 83 mi 133 km) and the upper limit as 750 mi. In the eighth essay (p. 153–194) a remarkably clear and ritical insight is shown into the nature and cause of the aurora, although a few erroneous conclusions re drawn. The possibility of the atmosphere reaching to 400 or 500 mi is suggested, though for 00 years it was assumed to extend not over 60 or 80 mi at most. He also demonstrated that the urora is closely connected with the earth's magnetic field, since every case of aurora was accompanied y a disturbance of the magnetic needle and vice-versa; the needle always pointed to the axis of the rc and the dip was parallel to the vertical beams, whereas the South Pole always pointed to the cone f the corona. DALTON recognized the optical illusion which, when allowed for, led to the con-lusion that the rays were parallel. A long section deals with the geometry of the height calculations. ith several schematic drawings to illustrate the method used. In another section the forms and uccession of forms is well treated, and, finally, the theory which is based on a supposition that the urora is an electrical phenomenon in the high atmosphere is elaborated. Current ideas were that ne aurora was reflected light, a flame arising from the earth, inflammable air set on fire by electricity, r sulphurous vapors from volcanoes mixing with a magnetic effluvia from the earth catching fire nd fulgurating. The effect of the moon is treated statistically with inconclusive results. The nnual march shows a minimum in summer and in Dec., maximum in April and Nov. The final ection correlates auroras with weather on succeeding days in a critical manner. *Subject Headings:* **. Auroral catalogs 2. Auroral heights 3. Auroral theories.**—*M.R.*

1828

4J–7 551.594.52

Dalton, John, **On the height of the aurora borealis above the surface of the earth; particularly ne seen on the 29 of March, 1826.** *Royal Society of London, Philosophical Transactions*, 120:291 02, **1828.** plate. **DLC**—A bright auroral band was observed on March 29, 1826 at many points n S. Scotland and N. England (Edinburgh–Manchester). DALTON collected as many reports as e could get by correspondence, from the press and by personal contacts with the observers. Select-ng two points, Whitehaven and Warrington, which are 83 miles apart and in the same magnetic eridian, he calculated that the angle of deviation of 75° from S. at the former and 61° from the N. t the latter would give an altitude of about 100 miles (160 km) and its position vertical above endal, which is in accord with observations from that place. Other base lines (120 mi) give height f 100–110 mi and length of arc of 550 mi. A nice diagram shows positions of observation points, istances from Warrington, relation to magnetic meridian and position of auroral band. Many ther similar observations of intense aurora are recounted and calculations of height given. Con-lusion is that height of luminous arcs are uniformly about 100 mi, but height of accompanying raperies (usually not associated with arc) cannot be determined—they may be above and may be elow the arcs. *Subject Headings:* **1. Auroral heights 2. Aurora of March 29, 1826 3. England . Scotland.**—*M.R.*

1835

4J–8 551.594.5

White, W. H., **Notices of 184 observations on aurora borealis made during a period of thirteen ears with the state of the weather immediately subsequent; being contributive to the further**

elucidation of their effects on the atmosphere. *Magazine of Natural History*, London, 8(50):343-345, June **1835. DSI**—Author noted carefully the commencement of changeable weather, i variation and duration and classified aurora according to their intensity. Among his finding 1) 24 very vivid and brilliant displays were followed by strong gales from SW in about 26 hrs, b no rain and 2) 39 rather faint, luminous displays were followed by rain in 36 hrs. Date and pla of observation not given. *Subject Headings:* **1. Auroral effects on weather 2. England.**—*M.L.R.*

1856

4J–9 551.594

Force, Peter (*comp.*), **Record of auroral phenomena observed in the higher northern latitude** *Smithsonian Contributions to Knowledge*, v. 8, Pub. 84, [1856]. 118 p. **DLC**—Descriptions auroras observed at St. John's, Newfoundland; Albany, N. Y.; Toronto, Canada; Beresov, Russi Iceland; Good Hope, Greenland; Baffin Bay; New Haven, Conn.; Davis Strait; Faroe Islands an numerous other points, most of which are north of 50° lat. Earliest date was 1746, latest 185 In addition to the date, the lat. and long. and the source consulted by the author are included f each observation. *Subject Heading:* **1. Auroral descriptions.**—*M.L.R.*

1868

4J–10 551.594.53:523.7

*Lovering, Joseph, **On the periodicity of the aurora borealis.** *American Academy of Arts an Sciences, Boston, Memoirs*, 10(1):9–351, **1868.** 79 tables, refs. **DLC**—A catalog of approximate 12,000 auroras which occurred between 502 B.C.–1868 A.D. MAIRAN's first and second catalo were used for the observations prior to 1750. Author lists vast quantity of material (U. S., Canadia English, Swedish, German, Russian, Austrian and Italian, etc.) used for observations since 175 A table shows monthly and total frequency for period before 1309 and for each year after 130 other tables give monthly and total frequency for a number of cities in the U. S. and Europe, f Western and Eastern hemispheres, etc. Auroral data are compared with sunspot observations sinc 1700. *Subject Headings:* **1. Auroral catalogs 2. Auroral periodicities 3. Sunspot data.**—*M.L.R.*

1870

4J–11 551.594.5(42

Smith, B. W., **The aurora borealis of September 24th, 1870.** *Royal Meteorological Societ Proceedings*, 5(51):216–219, Nov. **1870. DLC**—Report as seen by author while driving in the Wels hills. Detailed account of varying forms, colors and position seen from 7:30 p.m. until 3 a.m. B comparison, the aurora seen by HALLEY in 1716 (see 4J–2 above) was inferior in intensity an duration. *Subject Headings:* **1. Aurora of Sept. 24, 1870 2. Wales.**—*M.L.R.*

1871

4J–12 551.594.5(

Flögel, J. H. L., **Ueber die Höhe des Nordlichtes und dessen Lage im Raume.** [On the heig of aurora and its position in space.] *Österreichische Gesellschaft für Meteorologie, Vienna, Zeitschri* 6(21,23):353–362; 385–394, Nov. 1, Dec. 1, **1871.** fig. **DLC**—In order to determine more accurate the height and position of the aurora, detailed measurements were made of the auroras of Sept. 24, and of the Great Aurora of Oct. 24–25, 1870. Heights at various times, as observed at vario places in Europe, ranged from 100–250 km at the base to 500, 750 and even 900 km at top. T geographical positions are given in each case, ranging from France to Russia and Scotland to Austri It was seen as far south as Athens and Baghdad (Oct. 25). The rays were red toward the top, an were observed when they must have been in sunlight. A cross section shows the extent, height an structure of the Great Aurora. *Subject Headings:* **1. Auroral heights 2. Auroral position 3. Auro of Oct. 24, 1870 4. Europe.**—*M.R.*

1872

4J–13 551.594

Nash, W. C., **Notes upon the aurora borealis of 1871, November 10.** *Royal Meteorologic Society, Quarterly Journal*, 1(1):39–40, Jan. **1872. DWB**—Brief observations arranged in time ord as seen against a background of constellations. Aurora took the form of arcs and streamers; colo observed were red, white, greenish white and bluish white. *Subject Heading:* **1. Aurora of Nov. 1 1871.**—*M.L.R.*

1873

4J–14 551.594.5(719)

Abbe, Cleveland, **Catalogue of auroras from 1776 to 1784 in Labrador.** *American Journal of ience and Arts*, 106(32):151–152, Aug. **1873. DLC**—Lists days on which auroras were observed Nain (1776–1784) and Okkak (1778–1782). Auroras were seen at Nain 145 times and at Okkak times; comparison with Lovering's Catalogues (*see item* 4J–10 above) shows 99 new dates of uroras. This article was based on unpublished manuscript. *Subject Headings:* **1. Auroral catalogs Labrador.**—*M.L.R.*

4J–15 551.594.5

Denning, William F., **On the aurora borealis of April 1 and 2, 1873.** *Royal Meteorological ociety, Quarterly Journal*, 1(7):239–240, July **1873. DLC**—The first aurora appeared as a glow in e north near the horizon, was followed by a streamer, then an intense glow and then by an arc. he second was characterized by a succession of perpendicular streamers along the northern horizon. *ubject Heading:* **1. Aurora of April 1–2, 1873.**—*M.L.R.*

4J–16 551.594.5

*Donati, G. B., **Sul modo con cui si propagarono i fenomeni luminosi della grande aurora polare servata nella notte dal 4 al 5 febbrairo 1872.** [The manner in which the great aurora of 4–5 Feb. 72 was propagated.] *Florence. Universita. Osservatorio Astronomico in Arcetri, Memorie*, 1):5–30, **1873.** refs., table. Abstracted from reprint. **DWB**—Nine different theories of the use of the aurora, including that of the author, are listed and discussed. Reports of this most tensive aurora from Shanghai, Bombay, Taganrog, Damascus, Beirut, Odessa, St. Petersburg, exandria, Smyrna, Tunis, Algeria, Glasgow, Cadiz, the U. S. from Maine to North Carolina and om Washington south to California, Melbourne, Reunion, Yokahama, Lima, Santiago, Quito, uenos Aires, Maurice, Sicily and all over Europe were received in answer to a questionnaire. In any places in middle latitudes such as in N. United States and Central Northern Europe the aurora as observed to the south of the zenith, and was bright red. Finally, the fact that aurora was opagated from east to west is noted from a tabulation of places and times of observation (by ngitude) and the cause discussed. *Subject Heading:* **1. Aurora of Feb. 4–5, 1872.**—*M.R.*

4J–17 551.594.5

†Fritz, Hermann, **Verzeichniss beobachteter Polarlichter.** [Catalog of aurora observations.] enna, C. Gerold's Sons, **1873.** 255 p. **DLC**—The list of aurora borealis covers the period from 3 B.C. to Aug. 1872 A.D.; that for aurora australis covers the period from 1640 to Feb. 1872 A.D. bibliography, with abbreviations of citations, is included. *Subject Headings:* **1. Auroral catalogs Aurora borealis 3. Aurora australis.**—*M.L.R.*

1880

4J–18 551.594.5(481,485,489)

Tromholt, Sophus, **Iagttagelser over Nordlys ausillede i Norge, Sverige og Danmark September 78–April 1879.** [Observations of aurora borealis conducted in Norway, Sweden and Denmark, ptember 1878–April 1879.] *Norske Videnskaps-akademi i Oslo, Fordhandlinger*, No. 6, **1880.** 8 + p. fold. map, refs. **DLC**—Based on 100 reports from parishes, light houses and ship captains Norway and data obtained from 132 Norwegian, Swedish and Danish meteorological stations. total of 839 observations secured on 154 nights with aurora are listed. The hissing sound accom- nying some of the auroras is described. No correlation was found between auroras and meteoro- gical factors. Occurrence of aurora for each calendar day dependent on latitude is shown graphi- lly. Station location chart and drawings of some of the auroras are included. *Subject Headings:* **Auroral catalogs 2. Auroral frequencies 3. Norway 4. Sweden 5. Denmark.**—*W.N.*

1881

4J–19 551.594.5(02)

Fritz, Hermann, **Das Polarlicht.** [The aurora.] Leipzig, F. A. Brockhaus, **1881.** 348 p. figs., fold. maps, tables, refs. in text. **DLC**—The classical source of information about auroras. he author succeeded in reducing the bulky monographs and catalogs, published previously, into condensed readable form. Several chapters are devoted to visibility, direction, height, areal stribution and duration of auroras. Diurnal, annual, 11-year and secular periods are discussed d the relations to geomagnetism, sunspots, atmospheric and terrestrial electricity, weather and oon phases are analyzed. Numerous hypotheses on the nature of the aurora are summarized. he famous frequency map of aurora is reduced to the period 1700–1872. Due to the lack of uniform

observations it characterizes only the relative frequency, rather than giving absolute values. *Subj Headings:* **1. Auroras 2. Auroral frequencies 3. Auroral periodicity 4. Auroral distributi 5. Textbooks.**—*A.A.*

4J–20 551.59

Greely, Adolphus W. (*comp.*), **Chronological list of auroras observed from 1870–1879.** *U. Signal Office, Professional Papers of the Signal Service*, No. 3, **1881.** 76 p. tables, append. **DLC** This extensive compilation, with but few exceptions, is based on meteorological reports to the Ch Signal Officer of the Army. Appendix contains several tables of frequency of aurora with respect geographic distribution. *Subject Headings:* **1. Auroral catalogs 2. Auroral distribution 3. Auro frequencies 4. United States 5. Canada 6. Alaska.**—*M.L.R.*

1882

4J–21 551.594.5(798

*Nordenskiöld, Nils A. E., **Om Norrskennen under Vegas öfverventring vid Berings Sur 1878–79.** [Auroras observed during the wintering of the Vega in Bering Strait, 1878–79.] (In h **Vega-Expeditions iakttagelser bearbetade of deltagare i resan och andra forskare.** Stockhol F. G. Beijers Förlag, **1882.** V. 1, p. 401–452. 23 figs., tables, refs.) Also German trans.: **Wissenschaftlichen Ergebnisse der Vega-Expedition.** Leipzig, Brockhaus, **1883.** V. 1, p. 226–27 23 figs., tables, refs. **DCI-T**—The auroras observed during this winter in Bering Strait were most of the quiet arc type; only twice were rays observed (March 1879), although several times dou or even quadruple bows were seen. This was a winter of auroral minimum. Details of directio height, intensity, time, geographical position, spectrum, form, etc. given in the text and drawin The effect of the aurora in magnetic field (direction and intensity) was also noted. Height calcul tions gave average of 180 to 200 km for varying forms. *Subject Headings:* **1. Auroral data 2. Auro heights 3. Bering Strait.**—*M.R.*

4J–22 551.594.5(48

Rubenson, Robert, **Catalogue des aurores boréales observées en Suède despuis le XVIme siè jusqu'a l'année 1877 y comprise.** [Catalog of aurora boreales observed in Sweden from the 16 century to 1877 inclusive. Pt. I (1536–1799).] (*K.*) *Svenska Vetenskapsakademien, Stockhol Handlingar*, 15(5), **1879.** 184 p.; Pt. II (1800–1877), *ibid.*, 18(1), **1882.** 300 p. **DWB**—Yea month, day, hour, source and, usually, very brief description is given for each observation of aurora. An alphabetic list of places with lat. and long. (from Stockholm) and a list of abbreviatio of the sources used are included as well as fuller description of selected displays. *Subject Headin* **1. Auroral catalogs 2. Sweden.**—*M.L.R.*

1885

4J–23 551.594.5(48

Tromholt, Sophus, **Norwegian testimony to the aurora-sound.** *Nature*, London, 32(830):49 500, Sept. 24, **1885. DLC**—From 1000 questionnaires on the aurora sent out, author received 1 replies—64% believed in existence of aurora sound, 36% of these had heard it themselves, 15 never heard it or knew anything about it and the remainder disregarded the question. The vario sounds heard are listed—approximately 75. *Subject Headings:* **1. Auroral audibility 2. Norway.** *M.L.R.*

1886

4J–24 551.594.5(484.2,48

*Carlheim-Gyllenskiöld, Vilhelm, **Observations faites au Cap Thorsden, Spitzberg, par l'e pédition Suédoise. Tome II: 1. Aurores boréales.** [Observations made at Cape Thorsden, Spit bergen by the Swedish expedition. Vol. II: 1. Aurora borealis.] Stockholm, Académie Roya des Sciences de Suède, **1886.** 409+p. 110 figs., tables, 30 plates, refs. At head of title: Explorati Internationale des Régions Polaires, 1882–1883. **DWB**—Detailed catalog of auroras observed Cape Thorsden during the period Aug. 23, 1882–March 8, 1883. A comprehensive analysis of t auroras is given in tabular and graphical form, covering coordinates of the arcs, their form, displac ment, vorticity and light distribution, the intensity of auroral light, colors of auroras, auroral spectr noise and odor, elevation of arcs above ground surface, effect of atmospheric water vapor, ice crystal clouds, sunshine and atmospheric circulation, variation within the day and the year, etc. A journ of auroras observed at Uppsala during the same period is appended. Drawings of several individu auroras and of their projections on the globe are presented. *Subject Headings:* **1. Auroral catalo 2. Cape Thorsden, Spitsbergen 3. Uppsala, Sweden.**—*G.T.*

1888

4J–25 551.594.5(268)

*Greely, Adolphus W., **Report on the proceedings of the United States Expedition to Lady Franklin Bay, Grinnell Land.** Wash., D. C., Govt. Print. Off., **1888.** 2 v. numerous photos, tables, diagrs., maps (some fold.). At head of title: International Polar Expedition. **DSI**—Auroral observations are treated in Vol. II p. 386–400). Contains a record of auroras, with description, from July 3, 1881 to Feb. 27, 1883 and a table of relative frequency of aurora during hours in which a display could have been seen. *Subject Headings:* **1. Auroral catalogs 2. Auroral frequencies 3. Lady Franklin Bay, Canadian Arctic.**—*M.L.R.*

4J–26 551.594.53(268,71)

Lüznar, J., **Die 26tägige Periode des Nordlichtes.** [The 26-day period of auroras.] *Akademie der Wissenschaften, Vienna, Math.-Naturw. Klasse, Sitzungsberichte*, Abt. IIa, 97:1101–1116, Oct. 1888. fig., 3 tables, refs. **DLC**—The number of hours each day that auroras were observed at Bossekop, Jan Mayen and Fort Rae during Sept. 1882 to April 1883 (Polar Year) are presented in tables, corrected for lunar period and analyzed to show the strong 26-day periodicity which corresponds to the 26-day geomagnetic period. A common solar origin is presumed. *Subject Headings:* **1. Auroral periodicity 2. Bossekop, Norway 3. Jan Mayen 4. Fort Rae, N.W.T., Canada.**—*M.R.*

1892

4J–27 551.594.52(481)

*Trommholt, Sophus, **Vorläufige Mitteilungen über zwei Nordlichtwerke.** [Preliminary notes on two works on aurora.] *Petermanns Geographische Mitteilungen*, 38:201–214, 236–240, 259–262 1892. numerous tables. **DLC**—Detailed account of auroral observations made by the author in Kontokeino 69°N, 23°03'E) during the Polar Year 1882–83 (auroral forms, heights, position and intensity). Parallel measurements made at a distance of 100 km gave 114.6 km as mean height of 70 auroras. The second part of the paper summarizes the author's catalog of auroras for Norway (*see item* 4J–37 below). *Subject Headings:* **1. Auroral data 2. Auroral heights 3. International Polar Year, 1882–1883 4. Kontokeino, Norway.**—*A.A.*

1895

4J–28 551.594.5(02)

Angot, Alfred, **Les aurores polaires.** [Polar auroras.] Paris, Felix Alcan, **1895.** English trans.: **The aurora borealis.** London, **1896.** 264 p. 18 figs. **DLC, DWB**—This is the 3rd general work on the aurora to appear in any language, the second in French and the first to appear in English translation. MAIRAN (1731, *see* 4J–4 above) wrote the pioneer work in French, FRITZ (1881, *see* 4J–19 above) in German and ANGOT, the chief of the French Meteorological Service, the present work in 1895 which was translated into English in 1896, and was not superseded until the present decade except as chapters of encyclopedic work on broader aspects of geomagnetism. ANGOT cites numerous instances of auroras in the polar regions being observed or measured at heights of a few kilometers above the earth, or below tops of mountains or clouds. He admits that those in temperate latitudes are usually at great height. The present work is not as detailed as that of MAIRAN, but covers the entire field: history from Greek times; forms, color, intensity, nature, sound and odor; extent, height, frequency and orientation; periodicity (diurnal, annual and secular); relation to sunspots, clouds, weather, atmospheric electricity, geomagnetism, earth currents, magnetic storms; and theories (cosmic, optical, magnetic, electrical). A number of drawings are reproduced, and an extensive catalog of European auroras from 1700 to 1890 supplements that of MAIRAN. The theories of MAIRAN (1754), BIOT (1820), VON BAUMHAUER (1840) which ascribed the aurora to terrestrial or cosmic particles; the optical theories of DESCARTES, SIR JOHN FRANKLIN, WOLFERT (1873) and others, and the magnetic theories of HALLEY (1716), DALTON (1793), BIOT and VON BAUMHAUER (loc. cit.) are all rejected as being impossible, and the electrical theory of CANTON (1753), PRIESTLEY, FRANKLIN, FISHER (1834), etc., LEMSTRÖMT (1875) and EDLUND (1878) accepted. The basis of this theory is that electric charges carried from the earth to the upper atmosphere are partially brought to earth as disruptive discharges in low latitudes, but occasionally reach high latitudes where they are precipitated along magnetic lines of force to the earth where ice particles form the conducting media. (Ice comes closer to the earth in the Arctic). The active aurora of lower latitudes is another phenomenon and is caused by disturbances in the earth currents and magnetic field (which may be induced by sunspots) but is not the cause of such disturbances. Brief comment is made of auroral spectra (green auroral line) not yet produced in the laboratory. *Subject Headings:* **1. Auroral catalogs 2. Auroral theories 3. Auroral heights 4. Textbooks.**—*M.R.*

4J–29 551.594.53(4

*Mossman, R. C., **The aurora borealis in London from 1707 to 1895.** *Scottish Meteorologic Society, Journal*, 11(13/14):58–64, **1895.** 6 tables, ref. **DLC**—Lists old manuscripts and boo from which data were secured. Tables show monthly occurrence by year (a total of 447); maximu observed in any one month, monthly percentage frequency in N.E. Scotland (122 yrs), Edinburg (81 yrs) and London (189 yrs); number of daily observations; 5-day frequencies and decenni totals. *Subject Headings:* **1. Auroral frequencies 2. London, England.**—*M.L.R.*

1898

4J–30 551.594.5

Abbe, Cleveland, **Altitude of the aurora above the earth's surface.** *Terrestrial Magnetism a Atmospheric Electricity*, 3(1, 2, 4):5–12, 53–76, 149–178; March, June, Dec. **1898.** figs., refs. **DW** —"The object of the present paper is to collect together some of the numerous observations, calcul tions, and opinions bearing on the nature and the altitude of the auroral light." A review of the wo of a number of authorities from HALLEY (1716) (*see* 4J–2 above) to BOLLER (1896) is given in chron logical order. This is followed by a summary of the several methods of determining the altitude specific features in an auroral display. A translation of 2 pages of Vol. 3 of the results of the Inte national Polar Expedition sent out by Finland in 1882–1884 is added. *Subject Headings:* **1. Auror heights 2. Auroral height determination.**—*M.L.R.*

4J–31 551.594

†Boller, W., **Das Südlicht.** [The aurora australis.] *Beiträge zur Geophysik*, 3(1, 4):56–13 550–608, **1898.** figs., refs., bibliog. p. 78–87, 560–570. **DLC**—A collection of reports on aurora observed in the Southern Hemisphere compiled from many sources of German and foreign literatur It contains 1582 accounts of 791 different auroral phenomena observed during the period 1640–189 Geographical distribution and height of auroras are analyzed. Seasonal and annual frequency graphically presented and a 10–11-year periodicity established. Rich reference material is offere *Subject Headings:* **1. Aurora australis 2. Auroral distribution 3. Auroral heights 4. Auror frequencies 5. Southern Hemisphere.**—*G.T.*

4J–32 551.594.5:523.3:523

*Ekholm, Nils Gustaf and Arrhenius, Svante August, **Ueber den Einfluss des Mondes auf d Polarlichter und Gewitter.** [Influence of the moon on auroras and thunderstorms.] (*K.*) *Svensk Vetenskapsakademien, Handlingar*, 31(2), **1898.** 77+p. figs., 38 tables, refs., 8 eqs. **DLC.** Als **Ueber die nahezu 26-tägige Periode der Polarlichter und Gewitter.** [On the approximate 26-da period of auroras and thunderstorms.] *Ibid.*, 31(3), **1898.** 45+p. 27 tables, refs., 10 eqs. **DLC**— I. An elaborate statistical analysis of 41,835 auroral observations made in 18,340 days (in N. and S Hemisphere) to show relationship with lunar phase and declination is presented and discusse Even allowing for the effect of lunar phase and declination in visibility of aurora and for cloudines the authors think that the evidence is conclusive that the lunar effect is significant. A 2:1 rat exists between intensity in N. Hemisphere during southern lunations and in S. Hemisphere durin northern lunations and vice versa. Graphs show unsmoothed variations by season, lunar mont and tropical month. The latter seem much more pronounced and regular than the seasonal varia tions. Also a marked effect of aurora on atmospheric electricity was found. Positive charges we found near surface during auroras. II. Investigation by various authors of relation of aurora boreal and australis to sunspot periodicity (near 26 days) which showed marked correlation. Als investigated relation to thunderstorm periodicity and terrestrial magnetic and electrical effect *Subject Headings:* **1. Auroral-lunar relationships 2. Auroral periodicities 3. Sunspot effects.**—*M.*

1900

4J–33 551.594.5(481):7

Baschin, Otto, **Die ersten Nordlichtphotographien, aufgenommen in Bossekop (Lappland** [The first auroral photographs taken at Bossekop (Lapland).] *Meteorologische Zeitschrift*, 17:278 280, June **1900.** refs. 2 photos (after p. 336). **DLC**—Two photographs of auroral draperies mad by the author and MARTIN BRENDEL at Bossekop, Norway on Jan. 5 and Feb. 1, 1872 are the fir to show the ray structure of the aurora. TROMHOLT tried to photograph the aurora at the Pola Year station in 1882–3, but did not succeed. On March 15, 1885 (at Oslo) he succeeded in gettin an impression of the aurora on a plate by using an 8.5 minute exposure but this failed to show the fi structure as it was exposed too long. The first photograph reproduced here took one min and th second one 7 sec exposure. All the technical details as well as a description of the displays a included. *Subject Headings:* **1. Auroral photography 2. Bossekop, Norway.**—*M.R.*

1901

4J–34 551.594.5

Baldwin, Evelyn Briggs, **Auroral observations on the second Wellmann Expedition made in the ghborhood of Franz Joseph Land.** *Monthly Weather Review*, 29(3):107–115, March **1901.** VB—List of auroras observed from Oct. 7, 1898 to March 13, 1899 by author who was the me-rologist with the Expedition. Some of the displays are described at length. *Subject Headings:* **Auroral descriptions 2. Franz Joseph Land, U.S.S.R.**—*M.L.R.*

1902

4J–35 551.594.5(99)

Arctowski, Henryk, **Aurores australes.** [Aurora australis.] (In: Belgium. Commission de la elgica," Expédition Antarctique Belge, **Resultats du Voyage du S. Y. Belgica en 1897–1898–1899. pports Scientifiques, v. 3/4, Météorologie.** Antwerp, Buschmann, **1902.** 63 p. 36 figs., 2 plates, les, refs.) **DLC**—Report on the first systematic observations of auroras available for the Southern misphere. Describes 61 auroras identified from March 11 to Sept. 11, 1898 on the basis of visual servation from positions between 69°51′ and 71°36′S lat. Meteorological conditions prevailing ring the observation period are summed up and data on cloudiness tabulated. Diurnal and sonal auroral frequency is analyzed graphically and periodicities are established. Drawings of ical auroral forms are added. For preliminary notes and discussions of the same observational terial see: Arctowski, *Ciel et Terre*, p. 127, 1900; p. 501 and 553, 1901; *Acad. Sc. Paris, Comptes ndus*, p. 651, 1901; *Geophys. Journ.*, London, p. 92, 1900; Zenger, Ch. V., *Ciel et Terre*, p. 302, 00; Hazard, D. L. Terr. Magn. & Atm. Electricity, p. 85, 1901 and Harvey, A., *Geogr. Jour.*, 691, 1900. *Subject Headings:* **1. Aurora australis 2. Auroral frequencies 3. Antarctica.**—*G.T.*

4J–36 551.594.52(42) 551.594.53

*Backhouse, Thomas William, **Aurora borealis. Frequency of auroras and possible periodicity.** *nderland, Eng., West Hendon House Observatory, Publications*, No. 2:109–119, **1902.** 3 tables, ph. **DLC**—Lists all auroras observed by the author at or near Sunderland (and a few reported others) from Jan. 1860 to midsummer 1901, with their intensity (according to author's classifica-n). He attributes the rarity of auroras in the latter part of the period to the increasing size of the wn (more smoke and increase in number and brilliance of gas lamps). A table shows the fre-ency of auroras on each day (1 to 65 days) respectively, after an aurora has been observed. The ne data are presented graphically. An examination of the table and curve shows: 1) a diminution frequency as time goes on and 2) well marked maxima at intervals of about 28 days. *Subject adings:* **1. Auroral frequencies 2. Auroral periodicities 3. Sunderland, England.**—*M.L.R.*

4J–37 551.594.5(481,485)

*Tromholt, Sophus, **Catalog der in Norwegen bis Juni 1878 beobachteten Nordlichter.** [Catalog auroras, observed in Norway up to June 1878.] J. Fr. Schroeder (*ed.*). Oslo, **1902.** 422 p. merous tables and refs. **DLC.** Review by Cleveland Abbe in: *Terrestrial Magnetism and Atmos-ric Electricity*, 8:30–32, **1903.** 3 refs. **DLC**—A summary of all observations of auroras in rway since 1594, collected with enormous diligence. When the Norwegian government refused publish the work immediately, the angry author left the country. He died at the age of 45 before gotiations with ABBE for publishing in the U.S.A. could be completed. The work finally was nted after his death with funds raised by Norwegian scientific institutions. A comprehensive gives time, date, place for every single aurora, and a description of selected auroras, including her fantastic older descriptions. Monthly and annual totals are presented for 1762 1878. An-er table gives occurrences of auroras combined with the Swedish list of RUBENSON (*see* 4J–22 ove) for the Scandinavian peninsula. *Subject Headings:* **1. Auroral catalogs 2. Auroral fre-encies 3. Norway 4. Scandinavia. I. Schroeder, J. Fr.** (*ed.*) **II. Abbe, Cleveland.**—*A.A.*

1906

4J–38 551.594.5(491,988)

Arrhenius, Svante A., **Die Nordlichter in Island und Grönland.** [The aurora in Iceland and eenland.] (*K.*) *Svenska Vetenskapsakademien, Stockholm. Nobelinstitut, Meddelanden*, 1(6), **06.** 27 p. 3 figs., tables, refs. **DLC**—Data on auroral frequency in Iceland and Greenland 73–1903) are analyzed to determine the seasonal variations, the secular variations and the relation the 25–93-day period. The 11-year cycle was evident but not as pronounced as that reported by ITZ for Norway. The double annual maximum (Nov. and March) was noticed in recent years earlier a single Dec. maximum corresponding to daylight minimum was noted. The 25–93-day le was much weaker than in lower magnetic latitudes. A theory is presented to account for omalies between Norway and Iceland or Greenland which lie nearer the magnetic pole. *Subject adings:* **1. Auroral periodicities 2. Iceland 3. Greenland.**—*M.R.*

1908

4J–39 551.594.5

*National Antarctic Expedition 1901–1904, **Physical observations with discussions by var authors. Prepared under the superintendence of the Royal Society.** London, The Royal Soci **1908.** 192+p. numerous figs., tables, plates. **DLC, DWB**—Pt. IV, "Antarctic observation aurora, 1902–1903" (p. 99–126+p., figs., table, chart, plates). Contains a list of auroral displ from April 11, 1902 to March 13, 1903, with hour, form, position, altitude and reference to t perature, clouds, wind, etc. Several artistic drawings of auroras are reproduced. *Subject Headi* **1. Auroral data 2. Antarctica.**—*M.L.R.*

1909

4J–40 551.594.5

Eddie, L. A., **Aurora australis.** *British Astronomical Association, Journal,* 20(1):40–41, **1909. DLC**—Display visible at Grahamstown was one of finest ever observed by author. Ch acterized by a pulsating rosy-pink color chiefly in the east and south where it extended up bey the zenith. *Subject Headings:* **1. Aurora australis 2. Grahamstown, South Africa.**—*M.L.R.*

1910

4J–41 551.594.5 (

Barnard, E. E., **Observations of the aurora made at the Yerkes Observatory, 1897–1** *Astrophysical Journal,* 16(3):135–144, Oct. **1902.** Also: . . . **1902–1909.** *Ibid.,* 31:208– April **1910. DLC**—List gives date and hour of observance of every aurora and usually a b comment. Particular attention is called to the magnificent aurora of Sept. 10, 1898 whose obser tion was rather general (seen in England and on the continent on Sept. 9). The aurora of Oct. 1903 was observed widely over the U. S. Descriptions from several sources are given for each of th auroras. *Subject Headings:* **1. Auroral catalogs 2. Aurora of Sept. 10, 1898 3. Yerkes Observat Williams Bay, Wisconsin.**—*M.L.R.*

1913

4J–42 551.594.5:55

*Birkeland, Kristian, **On the cause of magnetic storms and the origin of terrestrial magneti** (In: **The Norwegian Aurora Polaris Expedition 1902–1903.** Oslo, **1908–13.** Vol. I, Sec. 1 an 801 p. 289 figs., 127 tables, 42 plates, refs., 48 eqs.) **DLC**—A classic work of basic importance the study of geomagnetic and auroral phenomena. The results of measurements are presented discussed in greatest detail, assuming that magnetic storms and auroras are caused by corpusc rays from the sun. The investigation is mainly based on a special Norwegian auroral networ 1902–03, including Iceland, Spitsbergen and Novaia Zemlia and on data from magnetic observato all over the world. Besides this, data obtained during the Polar Year 1882–83 are analyzed. pecially important are the numerous laboratory experiments, made with a magnetic terella under bombardment of cathode rays. Some results of STÖRMER's mathematical analysis are presen The author extends his assumptions to the explanation of various celestial phenomena, as the so of the sun's heat (decay of atoms), comet's tails, zodiacal light, Saturn's rings, nebulae, etc. *Su Headings:* **1. Magnetic storms 2. Experimental auroras 3. Corpuscular theory. I. Muir, Je** (*transl.*).—*A.A.*

1915

4J–43 551.594.5

Collier, H. B., **A daylight aurora.** *Royal Astronomical Society of Canada, Journal,* 9(6):331– July/Aug. **1915. DLC**—Observation of an aurora half an hour before sunset, April 22, 191 Viking, Alberta (lat. 53°N). Numerous, bright, hazy milk-like streamers were seen in front dark cloud. At times a wave-like effect seemed to travel across the series of streamers. *Su Headings:* **1. Aurora of April 22, 1915 2. Daylight auroras 3. Viking, Alberta.**—*M.L.R.*

1916

4J–44 551.594.5 (

Arngrimson, Frimann B., **The auroras of Iceland.** *Scientific American,* 114(16): 401, Apri **1916. DLC**—Descriptions of auroras observed in Oct. and Nov. 1915 at Akureyi, that of Nov being particularly beautiful—seven arcs formed a bridge of continually moving light which compl covered the sky. Estimated the heights of the auroras to be between 3000 and 9000 m. *Su Headings:* **1. Auroral descriptions 2. Akureyi, Iceland.**—*M.L.R.*

4J–45 551.594.5(99)

Mawson, Sir Douglas, **Auroral observations at the Cape Royds Station, Antarctica, British ntarctic Expedition, 1908.** *Royal Society of South Australia, Adelaide, Transactions and Proceedings,* 0:151–206, **1916.** 2 figs., 2 plates. **DLC**—Lists auroras observed at Cape Royds, Ross Island lat. 77°32′S., long. 166°12′E.) from March 26–Oct. 2 with hour, form, direction, variation of cloudiess, haze or snow, etc. A graph of daily time distribution shows maximum auroral activity between :45 a.m. and 3:30 a.m. and a graph of distribution in azimuth shows the phenomena to be most requent between NE. and E.; a series of 17 graphs illustrate time and place distribution. A map nowing the location of the station is included. *Subject Headings:* **1. Auroral catalogs 2. Auroral istribution 3. Cape Royds, Ross Island, Antarctica.**—*M.L.R.*

4J–46 551.594.52(481):77

*Störmer, Carl, **Über eine Nordlichtexpedition nach Bossekop im Frühjahr 1913.** [On an aurora xpedition to Bossekop in the spring of 1913.] *Meteorologische Zeitschrift,* 30(8):410–412, Aug. 913. 2 plates, ref. **DLC.** Also in: *Terrestrial Magnetism and Atmospheric Electricity,* 18(3):133–35, Sept. **1913.** 3 plates, table, ref. **Preliminary report on the results of the aurora-polaris expedition to Bossekop in the spring of 1913.** *Ibid.,* 20(1,4):1–12, 159–174, March, Dec. **1915.** 13 gs., refs.; 20 figs., plates; 31(2):45–56, June **1916.** 18 figs., plates. **Summary of the results of the urora-borealis expedition of 1913 to Bossekop, Norway.** *Ibid.,* 21(4):157–168, Dec. **1916.** 10 gs., 9 tables, refs., eqs. **DLC**—The German text gives a general account of the expedition (STÖRMER t Bossekop, BIRKELAND at Store Korsnes from Feb.–April 1913), a few photographs taken on movie lm, and remarks on the improvements in cameras, film and methods over those used by the author n 1910. In the second report remarks were made on the improvements in the photographing echniques as follows: 1) the exact time of the photograph appeared on each plate (an illuminated atch was included in the field of view of the camera); 2) head phones were used for talking between he base stations so that the arms would be free to work faster in changing plates, etc.; 3) the ase line was lengthened to 27.5 km (from 4.5 km) and 4) improvements were made in camera and lm. Moving pictures turned out a failure, though with fast cinema film they obtained good 1 sec xposures with 2 sec intervals, making excellent time-lapse records of auroral changes. A few of the est photos are reproduced. Height and position calculations are given in the third report, along ith some theoretical considerations of the nature of the particles and their behavior in a magnetic eld. The fourth article gives the height distribution by 1 km intervals from 86 to 223 km, and ngle altitude for 14 points from 229 to 323 km, for a total of 2500 single points. Analyses of data ead to conclusion that 2 primary maxima exist: one at 101–103 km and one at 105–108 km, and ther secondary maxima. Distribution of altitudes for 7 auroral types is also given in the tables. vidently the diffuse types are not so penetrating and hence do not occur at such a low altitude as he active curtains or streamers. Reports on this expedition also appear in *Académie des Sciences, aris, Comptes Rendus,* June 13, 1913; *Astrophysical Journal,* v. 38, 1913 and *L'Astronomie,* 1913. *ubject Headings:* **1. Auroral expedition, 1913 2. Auroral height frequencies 3. Auroral photography . Bossekop, Norway.**—*M.R.*

1920

4J–47 551.594.5(481)

*Vegard, Lars, **The position in space of the aurora polaris from observations made at the Haldde-bservatory, 1913–14.** *Geofysiske Publikasjoner,* Oslo, 1(1), **1920.** 172+p. 37 figs., 34 tables, 9 plates, refs., eqs. **DLC.** Review by S. Chapman in *Royal Meteorological Society, Quart. Journ.,* 7:71–72, Jan. **1921. DLC**—This monumental contribution to the height-distribution of the urora is based on the first few series of auroral photographs made with a base line in 1912–13 (*see* J–46 above), supplemented by the more extensive series made at Haldde and Bossekop Observatories n 1914 (about 800 pairs of which 434 were successful). The photographic apparatus (and recent nprovements thereon) is described and illustrated in detail. Methods of observation, stations and ase-lines, magnetic and solar conditions, methods of calculating position and height, tables of esults of these calculations (in great detail), description of each display, statistics of height and osition measurements, lower and upper limits, direction of arcs and auroral theory, direction of ay streamers, variation of light intensity (luminosity) along ray streamers, color changes of auroras nd, finally, the results of the Amundsen "Gjoa" Expedition of 1903–6 with respect to auroral bservations, are treated in separate paragraphs or chapters of this monograph. Scores of pairs f photographs of all types of auroras, together with the scaled-off data, are reproduced. Many omments are made on phenomena occurring after 1914 (as late as 1918). It is concluded that the ays vary in luminosity with variations in the angle between the rays and the magnetic lines of force nd vary in color with varying degrees of absorption (red indicating more complete absorption). he bulk of height determinations give 100–110 km for upper limit (extreme 335 km). *Subject eadings:* **1. Auroral height distribution 2. Auroral triangulation 3. Auroral theories 4. Auroral ntensity variations 5. Norway.**—*M.R.*

1921

4J–48 551.594.5(742

Brooks, Charles F., **Grand aurora of September 1–2, 1921 (at Silver Lake, N. H., lat. 43.9°N.** *Science*, Wash., D. C., 54(1397):329–330, Oct. 7, **1921. DLC**—Phenomenon lasted from 8 p.m till 3:45 a.m. At 2 a.m. sky was filled with enormous flashing curtains; later these curtains, tinge with red at the base, covered most of the sky. Brief mention of auroras on Sept. 4, 7 and 8. *Subje Headings:* **1. Aurora of Sept. 1–2, 1921 2. Auroral curtains 3. Silver Lake, N. H.**—*M.L.R.*

4J–49 551.594.5(481

*†Störmer, Carl, **Rapport sur une expédition d'aurores boréales à Bossekop et Store Korsne pendant le printemps de l'année 1913.** [Report on an aurora borealis expedition to Bossekop an Store Korsnes during the spring of 1913.] *Geofysiske Publikasjoner*, Oslo, 1(5), **1921.** 259+p 37 figs., 34 tables, 114 plates, refs., 43 eqs. **DLC**—The complete and "final" report on the 191 expedition to Bossekop and Store Korsnes where the author and BIRKELAND, respectively, operate from Feb. to April 1913, with a base line of 27 km (*see* 4J–46 above). By using an improved camer and fast move film they were able to get much better detail (using shorter exposure) in photographin auroras from 2 stations at once, than was obtained in 1910. Complete meteorological observation were kept at Alten (69°58′N., 23°15′E., 10 m) and are reproduced here in addition to the aurora journal. The greater part of this report consists of detailed measurements, photographs and sketche obtained from photographs. A substantial portion, however (p. 157–212), is devoted to the de velopment of the theory of origin and behavior of auroras, and Chap. V (p. 213–222) to a compariso between theory and observation, in which the results of the measurements are analyzed. In de veloping the theory of absorption of auroral radiation in the upper atmosphere, the author present a theory of the structure and composition of the atmosphere to 500 km height. He rejects A WEGENER's (1911) hypothesis that the main part of the atmosphere above 80 km is composed o hydrogen and a unknown gas geocoronium, in favor of a modification of HUMPHREYS' He, H theory although extending the N_2 about 40 or 50 km higher than the latter. A spiral path (of the rays is said to be mandatory in order to explain the observed penetration, etc. Störmer suggests mor multi-station photograph studies of the spectrum and of the movement of currents in space and o the magnetic field of the sun and of solar flares. *Subject Headings:* **1. Auroral expedition, 1913 Aurorae data 3. Bossekop, Norway 4. Store Korsnes, Norway.**—*M.R.*

4J–50 551.594.52(481

Störmer, Carl, **Sur l'aurore boréale du 13 mai 1920.** [On the aurora borealis of May 13, 1920.] *La Nature*, Paris, 172(26):1672–1673, June 27, **1921.** fig., table, ref. **DLC**—A score of photograph taken simultaneously from 2 stations to determine altitude and a dozen photographs of aurora coronas to determine the radiation point of auroral rays were secured. One pair of special interes was taken simultaneously at Oslo and Oscarsborg (27.36 km apart). It represents a long aurora ray, for which the position in space of 6 points was determined (shown in table); ranging from 192 t 470 km above the earth's surface. The summits of the rays of the aurora of March 22–23, 192 were found to be between 500 and 600 km. *Subject Headings:* **1. Auroral heights 2. Aurora of Ma 13, 1920 3. Southern Norway.**—*M.L.R.*

4J–51 551.594.5(99

*Wright, Curtis Seymour, **Observations on the aurora.** London, Harrison and Sons, 192 46 p. 17 tables, refs., append. **DLC**—The report consists of 4 parts: 1) auroral observations a Cape Evans, 1911; 2) auroral observations at Cape Evans, 1912; 3) auroral observations at Cap Adare, 1911 and 4) general discussion of auroral observations. Discussion and data for Pt. 1 an 3 deal with auroral intensity, trend and rotation of arcs, distribution of aurora in azimuth, diurna frequency of different types of aurora, diurnal frequency and brightness of aurora, etc. The las part of the report takes up the relationship between magnetic disturbances and auroral displays *Subject Headings:* **1. Aurora australis 2. Auroral intensities 3. Diurnal auroral frequencies 4. Mag netic disturbances 5. Antarctica. I. British "Terra Nova" Antarctic Expedition, 1910 1913.**— *M.L.R.*

1922

4J–52 551.594.

Griffin, J. G., **Audibility of the aurora.** *Royal Astronomical Society of Canada, Toronto, Journa* 16(7):255–260, Sept./Oct. **1922. DLC**—Presents information from several sources, chiefly Australia and Canadian, on the faint swishing or crackling sound heard during auroral displays. Discount explanation that the sound results from a sudden freezing of the breath because it has been hear at about lat. 54° in July and Aug. Points out that there is no record of this peculiar sound bein heard when *auroras were absent. Subject Heading:* **1. Auroral audibility.**—*M.L.R.*

1923

4J–53 551.594.5

Chree, C., **Aurora and allied phenomena.** *Royal Meteorological Society, Quarterly Journal*, 49(206):67–74, April **1923.** refs. **DWB**—Review of knowledge of aurora as to: 1) height determination, particularly the work of STÖRMER and other Norwegians; 2) geographical distribution; 3) relationship between auroras and sunspot development; 4) annual variation in auroral frequency; 5) connection between simultaneous auroral and magnetic phenomena and 6) auroral theories, with reference to BIRKELAND, STÖRMER, etc. Concludes with suggestions for future research. *Subject Heading:* **1. Auroras.**—*M.L.R.*

1926

4J–54 551.594.5(481)

Störmer, Carl, **Nordlichtphotographien vom südlichen Norwegen zur Bestimmung der Höhe und Lage des Nordlichtes.** [Auroral photographs from southern Norway to estimate the height and position of the aurora.] *Naturwissenschaften*, 14(27):631–634, July 2, **1926. DLC**—In 1923, -4, -5 and -6, photographs by the hundreds were made of the aurora from 6 telephonically interconnected stations in southern Norway. The most brilliant displays which occurred on Jan. 26, March 5 and 6, 1926 are described in detail and one illustrated by two simultaneous photographs made at Bygdö and Tömte. Height measurements gave rays from 131 to 350 km height and 72° above the horizon. Observers in several places reported that the extreme auroras affected their radio reception and when the aurora was at the zenith or to the south the telephone was interrupted by a roaring noise. *Subject Headings:* **1. Auroral photography networks 2. Auroral descriptions 3. Auroral effects 4. Norway.**—*M.R.*

1927

4J–55 551.594.52(481)

Effect of sunlight on the altitude of auroral rays. *British Astronomical Association, Journal*, 37(9):363, Sept. **1927. DLC**—Brief note referring to a letter from STÖRMER in *Nature*, 120:329, Sept. 3, 1927. Aurora of Sept. 8, 1926 was remarkable for height (300–500 km). STÖRMER observed that these altitudes only occurred in the part of the upper atmosphere illuminated by the sun. "It seems, therefore, that sunlight has a remarkable action on the upper atmosphere causing the electric rays forming the aurora to become visible to a much greater height than usual." *Subject Headings:* **1. Aurora of Sept. 8, 1926 2. Auroral heights 3. Sunlit auroras 4. Norway.**—*M.L.R.*

4J–56 551.594.5(481)

Jelstrup, Hans S., **The aurora of October 15, 1926, in Norway, and the sounds associated with it.** *Nature*, London, 119(2989):45, Jan. 8, **1927. DLC**—Observation by author and his assistant of an aurora near Oslo. The aurora reached its maximum at 1915 GCT and appeared "yellow-green and fan-shaped, it undulated above, from zenith downwards and at the same time both of us noticed a very curious faint whistling sound distinctly undulatory, which seemed to follow exactly the vibrations of the aurora." From 2001 to 2006 GMT the registering of rhythmic time signals from the LY station at Bordeaux was disturbed by the "aurora static." A table gives the maximum impulses of "aurora statics" and their duration. This static was not observed after the aurora disappeared. A note by CARL STÖRMER (p. 45–46, fig.) states that he had the aurora stations at Oslo and 4 other points in operation from 1800 GMT on Oct. 15 to about 0200 the next morning. During this time about 70 successful photograms for the determination of height were secured but none of them were taken during the period in which JELSTRUP heard the whistling sound. STÖRMER believes that the sounds JELSTRUP heard did not come from the aurora but from the surroundings and were the results of electrostatic discharges caused by the varying electrostatic discharges of the aurora. *Subject Headings:* **1. Auroral audibility 2. Aurora of Oct. 15, 1926 3. Norway. I. Störmer, Carl.**—*M.L.R.*

4J–57 551.594.5(931)

Kidson, Edward, **Aurora australis observed in New Zealand, Oct. 22, 1927.** *Terrestrial Magnetism and Atmospheric Electricity*, 32(3/4):188, Sept./Dec. **1927.** Also: **Notes on aurora in New Zealand.** *Ibid.*, 34(2):159, June **1929.** Also: **Notes on aurora australis.** *Ibid.*, 36(1):57, March **1931.** table. And: **Aurora australis, May 29–30, 1932.** *Ibid.*, 37(3):278, Sept. **1932. DLC**—First two articles describe displays observed at Ophir in central Otago; the third gives a table with date, latitude, longitude and station, and the fourth reports a display seen in South Island. *Subject Headings:* **1. Auroral descriptions 2. Auroral catalogs 3. New Zealand.**—*M.L.R.*

4J–58 551.594.52(481)

*Störmer, Carl, **On an aurora curtain of violet-gray colour situated at a high altitude photographed on September 8th, 1926.** *Beiträge zur Geophysik*, 17(2):254–269, **1927.** 7 figs., tables,

5 plates, refs. Abstracted from reprint. **DWB**—A number of photograms of this unusual auro was taken at Bydge and Oscarsborg. Measurements showed it to be from 300 to 500 km hig The curtain later became a feeble diffuse mass; a photogram indicating a possible height of 1000 k Photographs are reproduced along with tabular data. A report of the same aurora as observed a Lerwick Observatory in Scotland is included. *Subject Headings:* **1. Auroral heights 2. Norway.**— *M.L.R.*

4J–59 551.594.5(26

*Sverdrup, Harald Ulrik, **Magnetic, atmospheric-electric and auroral results, Maud Expeditio 1918–1925.** *Carnegie Institution of Washington. Dept. of Terrestrial Magnetism, Researche* v. 6, **1927**; *Carnegie Institution of Washington, Publication,* No. 175, v. 6, **1927. DLC**—Observatio of the aurora, 1918–1925 are treated on p. 461–513 (tables, plates, refs.). Although the Expeditio was equipped to make double station photographs, the plan to do so had to be abandoned. Sing station photographs and visual observations were made. Three tables list auroras observed fro Sept. to March 1922–1923, 1923–1924 and Sept. 1924 to April 1925 with date, local mean time, form brightness, position in sky and altitude. Discussion and data on auroral frequency, characteristi of arcs and coronas, periodicity of auroras, etc. included. Among the results noted were these 1) the zone of maximum auroral frequency for the years 1922 to 1925 in long. 160° east was ap proximately 77° or 78° north lat., 2) average direction of the arcs was found in all latitudes to b nearly perpendicular to the direction of the magnetic meridian, 3) near the maximum zone, durin Oct.–March, no systematic variation could be found in frequency from month to month and 4) fr quency of the aurora varied during the night and showed in all three mean latitudes a maximu between 22 h and 2 h. Photographs taken oft the north coast of Siberia are reproduced and d scribed in the text. *Subject Headings:* **1. Auroral data 2. Auroral frequencies 3. "Maud" Exped tion, 1918–1925 4. Arctic.**—*M.L.R.*

1928

4J–60 551.594.5

Chapman, Sydney, **Origin of the aurora polaris.** *Physical Review,* 32(6):993–995, Dec. 192 ref. Hulburt, E. O., **Reply to the foregoing criticism by S. Chapman.** *Ibid.,* p. 996. **DLC**— criticism of HULBURT's new theory of aurora (*see* 4J–61 below). Points out following weaknesse 1) seems incapable of explaining a polar concentration of ions produced in low latitudes by UV sola radiation, 2) according to proposed theory, the aurora is primarily a day-time phenomenon and seems incapable of accounting for the existence of a zone of maximum auroral frequency and f the thinness of auroral curtains. On the other hand, author believes that the "tendency shown b marked outbursts of auroral and magnetic disturbance to recur after the lapse of solar rotatio period is strong evidence for their production by means of a limited corpuscular stream from th sun, rather than by ultraviolet radiation" and "that aurora are manifestations of the entry into th earth's atmosphere of solar corpuscles, which are deflected polewards, while still outside the earth atmosphere, by the earth's magnetic field." Hulburt in his reply states that forthcoming paper show that the ion spray caused by UV radiation may reach heights of about 30,000 km above the equato and may distil to within 20° or 30° from the magnetic poles—the zones of maximum auroral fr quency. *Subject Headings:* **1. Auroral theories 2. Hulburt's theory.**—*M.L.R.*

4J–61 551.594.5

Hulburt, E. O., **The origin of the aurora borealis.** *Terrestrial Magnetism and Atmospher Electricity,* 33(1):11–13, March **1928.** 8 refs. **DLC**—Refers briefly to the theory developed b BIRKELAND, STÖRMER, VEGARD and others "that the aurora is caused by charged particles emitte from the sun which under the influence of the magnetic field of the earth are diverted to the pola regions" where "their energy is given to the atmosphere and by some process is converted partiall or totally into the auroral light." Points out difficulties of this theory. The author believes tha UV light coming from the sun to the earth is a more probable cause of the aurora. Part of this U light is absorbed in the high atmosphere of the earth and produces ions and electrons which diffus with little recombination because of low pressure. At great heights (above 200 km) the ions wi migrate to the polar regions and form a concentration there. Moving to lower levels, they recombin and set free their energy of recombination in some way to cause an aurora. Considers STÖRMER discovery of an aurora observed in that part of the atmosphere directly illuminated by the sun (se *Nature,* 120:329, 1917) to be in keeping with author's ideas. Rough quantitative estimate of th intensity of aurora illumination made at Chebeague Island, Maine, on Aug. 20, 1927 shows th total energy of the auroral light upward and downward to be about $2\times10^{-2}\times5\times10^{16}=10^{15}$ erg sec^{-1} In the ionization calculation (see *Physical Review,* June 1928) it has been shown that an energ 6×10^{13} erg sec^{-1} is available to produce an aurora under ordinary solar influence. In times o sunspot activity much more may be available. *Subject Headings:* **1. Auroral theories 2. Hulburt' theory 3. Auroral physics.**—*M.L.R.*

4J–62 551.594.52(481,431/5):550.385

Röstad, A., **Über die Einwirkung der magnetischen Perturbationen auf die geographische rbreitung des Nordlichts.** [On the influence of magnetic disturbances on the geographic distribun of auroras.] *Geofysiske Publikasjoner*, Oslo, 5(5), 1928. 19 p. 18 figs., 2 tables, refs. **DLC**—ata from Trondheim, Norway for 1885–1915 supplemented by data from observations at Oslo d from the Netherlands and magnetic data from Potsdam are used to show the variations in the ation between time of occurrence of the aurora and magnetic disturbances with respect to the ographic location of the display (N. or S. of the station where it was observed). The advent of an roral display usually occurs simultaneously with the onset of the magnetic disturbance, and the axima of both phenomena occur simultaneously. On most auroral days the maximum of the factor occurs in the evening and the minimum in the morning. Ray forms are accompanied a greater disturbance than are diffuse auroras. *Subject Headings:* **1. Auroral frequencies 2. Aural magnetic relationships 3. Norway 4. Potsdam, Germany.**—*M.R.*

4J–63 551.594.5:77

Sverdrup, Harold Ulrik, **On the importance of auroral photographs taken from one station.** *rrestrial Magnetism and Atmospheric Electricity*, 33(4):198–202, Dec. **1928.** 7 figs., refs. **DLC**—escribes briefly the method developed by STÖRMER for computing altitude and position in space of rora and lists some of the results obtained by STÖRMER, VEGARD and KROGNESS in their investigaon of parallactic photographs. Remainder of paper is devoted to a discussion of the interesting sults which can be obtained from single-station photographs. Using WESØE's results (*see* 4J–65 low), he points out certain features of homogeneous arcs, streamers and coronas which can be udied with single photographs, e.g., direction of arcs, the radiation point of a corona, etc. *Subject eadings:* **1. Auroral photography 2. Single station photography.**—*M.L.R.*

4J–64 551.594.5(02)

*Vegard, Lars, **Nordlicht.** [Aurora.] (In: WIEN, WILHELM, **Handbuch der Experimentalysik.** v. 25, Pt. 1, Leipzig, **1928.** p. 385–476. 19 figs., 15 tables, 3 plates, refs., 33 eqs.) **DLC**—uroral forms, height distribution, relation to geomagnetism, direction of arcs and draperies, diurnal, onthly and annual variation, secular periods, terrestrial and cosmic radiation theories, BIRKELAND's periments, STÖRMER's computations, physical measurements, light distribution with height, roral spectrum and the upper atmosphere, experimental verification of VEGARD's hypothesis of rora (bombardment of solid nitrogen with cathode rays produces typical auroral spectrum), night y light and vertical temperature distribution in the upper atmosphere are the main topics discussed his summary of scientific results. *Subject Headings:* **1. Auroras 2. Origin of auroras 3. Experiental auroras 4. Textbooks.**—*A.A.*

4J–65 551.594.5

*Wesøe, Ragnvald, **Aurora photographs.** (In: **Norwegian North Polar Expedition with the Maud" 1918–1925. Scientific Results.** Bergen, **1928.** v. 1, No. 6. 28+p. 15 figs., 4 tables, plates, refs.) **DSI**—Parallactic photography was impossible, but the geographic position of the rora was found by assuming the elevation to be known. This method developed by STÖRMER, is mmarized in the paper. A number of photographs are reproduced, accompanied by explanatory aterial. Extensive tabular data is included. *Subject Headings:* **1. Auroral photographs "Maud" Expedition, 1918–1925 3. Chuckchee Sea.**—*M.L.R.*

1929

4J–66 551.594.5

Störmer, Carl, **International co-operation for auroral research.** *Royal Astronomical Society Canada, Toronto, Journal*, 23(1):1–7, Jan. **1929.** 2 figs. **DLC**—First gives a brief resume of the notographic method. Then outlines possibilities for international cooperation including the use the Photographic Atlas and a proposal for the establishment of a series of photographic stations ound the auroral belt. Concludes with a summary of auroral research underway or planned for orway, Sweden, Finland, Greenland, Shetland Islands, Alaska and possibly in Russia. *Subject eadings:* **1. Auroral research 2. Auroral photography.**—*M.L.R.*

1930

4J–67 551.594.5(798)

Johnson, James Halvor, **Concerning the aurora borealis.** [Berkeley, Calif., Gazette Press, **930.**] 29 p. photos. **DWB**—In the first section, "On the altitude of aurora," the author quotes om several scientists as to the height of aurora. He states that careful measurements have deter-

mined the lower limits at not less than 87 km but on basis of auroras he observed at Eagle, Ala in the winter of 1901 believes that auroras have occurred on rare occasions at lower altitude places where instruments for measuring altitude were not available. In the second section "Auroral sounds" a number of quotations are given along with the author's personal observat The next section contains a letter which the author has published in several newspapers in Ala and Yukon Territory asking for accounts of personal observations of low aurora or sounds acc panying the phenomenon and the replies received. *Subject Headings:* **1. Auroral audib 2. Alaska.**—*M.L.R.*

4J–68 551.594.52(4

Lee, A. W., **Auroral observations at Lerwick Observatory, 1924–1929.** *Great Britain. Mete logical Office, Professional Notes*, No. 56, **1930.** 11 p. **DWB**—Meteorological conditions w favorable on 30% of the evenings and auroras were observed on 50% of these evenings. Aur frequency is high from Sept. to Nov. and Feb. to April; lower in Dec. and Jan. Frequency incre considerably from 19 to 21 h, more gradually until 23 h; the frequency of ray structure is greates 21 h. Aurora and magnetic disturbance are usually coincident, but on 5 occasions of auroral acti the magnetograms showed no disturbance. *Subject Headings:* **1. Auroral frequencies 2. Lerw Observatory, Shetland Islands.**—*M.L.R.*

4J–69 551.594.5(4

Störmer, Carl, **Twenty-five years' work on the polar aurora.** *Terrestrial Magnetism and Atm pheric Electricity*, 35(4):193–208, Dec. **1930.** 17 figs., 17 refs. **DLC**—Author gives a short acco of his research which began in 1903 with the mathematical study of the phenomena suggested BIRKELAND on cathode rays in a magnetic field. In 1909 he decided to use photographic meth In 1910 and 1913 made expeditions to Bossekop (*see* 4J–46 above) to photograph auroras and measure the height of auroras by taking photographs simultaneously at two stations connected telephone. Results of expeditions show that the aurora was situated between 87 and 350 km. work of determining heights of auroras has been continued from a network of auroral station southern Norway with base lines varying from 27 to 258 km. Frequently, simultaneous photogra have been taken from 3 or 4 stations in order to check calculations of height. Auroras in south Norway reach a little lower (80 km) than in northern Norway, but the upper limits for aur rays may reach from 800 to 1000 km. Violet-gray aurora of Sept. 8, 1926 with height of 300 km gave the author the idea that it lay in the upper atmosphere in full sunshine. Illustra material includes chart of the lines of equal frequency of aurora (from FRITZ), photographs of aur forms and diagrams showing altitude of auroras. *Subject Headings:* **1. Auroral research 2. Aur heights 3. Norway.**—*M.L.R.*

1931

4J–70 551.5

Chapman, Sydney, **The audibility and lowermost altitude of the aurora polaris.** *Na* London, 127(3201):341–342, March 7, **1931. DLC**—Also: Gates, R. Ruggles, **The audibility lowermost altitude of the aurora polaris.** *Ibid.*, 127(3204):486, March 28, **1931. DLC**—Aut discusses collections of reports of observation of low and audible auroras in Alaska and Norw These contain reports of auroras even to ground level, while the nature of the sound varies. H is expressed that the new Polar Year (1932–1933) will offer more opportunities to examine critic the appearance of low auroras. The article by GATES is a reply to CHAPMAN in which he rep on an aurora seen at Fort Smith, in the Canadian Arctic, on Aug. 10, 1928. A swishing or hiss sound was heard and the height of the aurora was estimated to be a fraction of a mile. Consid almost simultaneous sight and sound as proof of low altitude. *Subject Headings.* **1. Auroral audib 2. Low altitude auroras 3. Alaska 4. Norway 5. Canadian Arctic. I. Gates, R. Ruggles.**—*M.L*

4J–71 551.594.52(4

Corlin, Axel, **Observations of a low altitude aurora and simultaneous phenomena.** *Na* London, 127(3206):553–554, April 11, **1931.** table. **DLC**—At Abisko (lat. 68°21′N.) on the af noon of Nov. 16, 1929, a reddish yellow auroral ray was observed by the author in the WSW about 1000 m above the ground, "below a completely cloudy sky." The same phenomenon been seen a short time earlier by several railway workers in Abisko and on the line between there Narvik, Norway. Reference is made to low altitude aurora observed on the same day by CUMM at Norwood, Ontario (*see* 4J–72 below). Author examines the magnetograms of the geophysical servatory at Abisko and his readings of the ionization chamber for Nov. 16, 1929. Unusually la deviations of Z and D occurred at about the same time the railway workers at Abisko observed low altitude aurora. Ionization reading (table included) shows maximum ionization at the tim the display. *Subject Headings:* **1. Low altitude auroras 2. Magnetic disturbances 3. Ion tion 4. Abisko, Sweden.**—*M.L.R.*

4J–72 551.594.52(71)

Cummings, A. C., **A low aurora and its effect on a radio receiver.** *Nature*, London, 127(3194): 108, Jan. 17, **1931. DLC**—Author's brother, while at Norwood, Ontario, Canada in the winter of 1929–1930, noted on one occasion that his radio was "dead." The tubes were lighted and aerial and ground wires were connected. Going outside to get a better view of an aurora, he observed that "a curtain of streamers extended from the sky to the ground and completely surrounded the house but at a distance of several feet." "Visible sparking" and "snapping sounds" also observed. *Subject Headings:* **1. Low altitude auroras 2. Auroral effects 3. Radio reception 4. Norwood, Ontario.** —*M.L.R.*

4J–73 551.594.5(99)

*Davies, Frank T., **Observations of the aurora australis. Byrd Antarctic Expedition, 1929.** *Terrestrial Magnetism and Atmospheric Electricity*, 36(3):199–230, Sept. **1931.** 19 figs., 2 tables, 3 refs. **DLC**—A 24-hour watch was maintained from March to Sept. 1929 and auroras were observed on 1,415 occasions of ½ hour or longer intervals. Each observation gives time, classification, intensity, direction, altitude, color, winds, clouds and observers remarks. "During the period of observations, (a) the average intensity decreased continuously from April to Sept.; (b) the frequency of displays seen to those possible, decreased; (c) although most displays were seen in the east, the proportion in the west increased; (d) the proportion at a high altitude and the mean altitude increased and (e) the proportion of displays with rays increased." Noted increase of auroral activity on same day or day after magnetic activity. Observed a period corresponding to solar rotation—26–30 days. Diurnal variation in intensity and diurnal and monthly variation in type are given. No audible phenomena and no aurora below cloud level observed. *Subject Headings:* **1. Aurora australis 2. Auroral frequencies 3. Auroral distribution 4. Little America, Antarctica.**—*M.L.R.*

4J–74 551.594.52(774)

Ford, Clinton B., **Simultaneous height observations of the aurora of September 18, 1930.** *Popular Astronomy*, Northfield, Minn., 39(2):112–113, Feb. **1931.** fig. Also: **The height of the auroral band on June 8, 1931.** *Ibid.*, 39(7):428–429, Aug./Sept. **1931. DLC**—The author, of Ann Arbor, Mich., and BERT C. DARLING of Lansing observed this aurora simultaneously and plotted the phenomenon on the No. 1 maps furnished by the American Meteorological Society for meteor work. These maps were superimposed on a third map. The author describes his method of calculation and determines the height of the aurora as being 196.414 mi!! In the second article the same procedure was used to estimate the height of the aurora of June 8. It was found to be 301.38 mi. Although these heights were abnormally high as compared with those found in Norway and Canada by photographic means, the author considers these as about as accurate as can be obtained by visual means. *Subject Headings:* **1. Auroral heights 2. Visual observation of auroras 3. Michigan.**—*M.L.R.*

4J–75 551.594.5

Hulburt, E. O., **On the diurnal variation of the aurora polaris.** *Terrestrial Magnetism and Atmospheric Electricity*, 36(1):23–40, March **1931.** 14 figs., 11 refs. **DLC**—Using data from several sources, curves are constructed to show the diurnal variation of auroral forms (glows, arcs, rays, curtains and corona) at 7 points in the Northern Hemisphere and points in the Southern Hemisphere. The author concludes that the "diurnal variation of auroral forms is complex." *Subject Headings:* **1. Auroras 2. Diurnal auroral variations 3. Northern Hemisphere 4. Southern Hemisphere.**

4J–76 551.594.52(71)

*McLennan, J. C., Wynne-Edwards, H. S. and Ireton, H. J. C., **Height of the polar aurora in Canada.** *Canadian Journal of Research*, Ottawa, 5(3):285–296, Sept. **1931.** 4 figs., 2 maps, 4 plates, 2 tables, ref., 3 eqs. **DLC**—Observations were made at Onokawa and Coral Rapids in northern Ontario in Jan. and Feb. 1931 with special cameras. STÖRMER's method (*see* 4J–46 above) was used to calculate heights and distances. Sketches, photographs and detailed tabular data are included. Heights ranged between 70 and 130 km with maximum frequency between 90 and 95 km. *Subject Headings:* **1. Auroral heights 2. Ontario, Canada.**—*M.L.R.*

4J–77 551.521.4 551.594.5

Rayleigh, (Robert John Strutt) Lord, **On a night sky of exceptional brightness, and on the distinction between the polar aurora and night sky.** *Royal Society of London, Proceedings, Ser. A*, 131(817):376–381, May **1931.** plate, table, refs. **DLC**—An exceptionally bright night sky on Nov. 8, 1929, is described, with photometric observations. It was of about four times the ordinary brightness, and eight times the minimum ever observed. It was of the same chromatic constitution as usual and the aurora line was not conspicuous. There was no accompanying magnetic disturbance.

This is contrasted in detail with the aurora of May 14, 1921. Spectra of the aurora and of the norma night sky are reproduced for comparison. Nitrogen bands are absent in the latter. Two unidentifie bright lines in the night sky spectrum are remeasured. The wave lengths found are 4419 and 4168 *Subject Headings:* **1. Light of the night sky 2. Auroras 3. Essex, England.**—*Author's abstract.*

4J–78 551.594.

Störmer, Carl, **Über die Probleme des Polarlichtes.** [On the problem of auroras.] *Ergebniss der Kosmischen Physik*, Leipzig, 1:1–86, **1931.** 70 figs., refs., eqs. **DLC**—One of the important contributions to our knowledge on auroras. A series of photographs shows different auroral forms Photographic equipment is briefly described. Determination of auroral heights shows frequency maxima for 101 and 106 km, explained by atmospheric tides. A lengthy discussion is devoted to the phenomenon of auroral rays illuminated by the sun, and to other unusual forms. Problems con nected with the auroral spectrum are only briefly mentioned but a detailed summary is given o author's mathematical theory of auroras, based on the equation of motion for charged corpuscles i the magnetic field of an elementary magnet, showing that there are certain parts of the space aroun the magnetic earth (the ring form "torus space"), prohibited for electrical corpuscles. An experi mental verification was found by the discovery of echoes of radio waves, reflected from the borde surfaces of the "torus space," which had been produced in a laboratory experiment by BIRKELAN (1901). The picture gets more complicated if gravitational forces are also considered in the theory *Subject Headings:* **1. Auroral forms 2. Auroral heights 3. Auroral theories 4. Radio echoes fro auroras 5. Torus space.**—*A.A.*

1932

4J–79 551.594.52:551.524.

Angenheister, G., **Die Höhe der Polarlichter und die Temperatur der oberen Atmosphäre** [Height of the aurora and temperature of the upper atmosphere.] *Terrestrial Magnetism an Atmospheric Electricity*, 37(4):431–438, Dec. **1932.** 2 figs., tables, refs., eqs. **DLC**—Air density and temperature of the upper atmosphere up to 700 km are derived from differences in daytim and nighttime altitude of auroras. According to the author's reasoning the atmosphere would warm up to 1000°A between 100 and 200 km altitude and consequently expand considerably. It would contract during nighttime, cooling down to 300°A. Other methods of determining stratospher temperature are reviewed *Subject Headings:* **1. Auroral heights 2. Upper air temperatures.**—*G.T*

4J–80 551 594.52(481

Chapman, Sydney, **Low altitude aurorae.** *Nature*, London, 130(3290):764–765, Nov 19, 1932 fig. **DLC**—A series of 20 pairs of photographs taken at the Auroral Observatory, Tromsø, Norway on the night of March 8, 1932 revealed an auroral bow with a height of only 65 km—the lowes aurora ever measured by auroral photography. The figure (reproduced from *Gerlands Beiträge* 37:109–115, 1932. *See* 4J–81) shows: 1) all measured heights of yellow-green auroral bows observed at Tromsø from Feb. to Oct. 1929, 2) measured heights of red-edged, yellow-green bows observed on March 8 and 3) heights of other yellow-green bows on same evening. Author suggests that lo auroras (65 km) may penetrate the atmosphere with 5 times as much force as those that came dow to 80 km. He believes that "every reduction in auroral heights substantiated by parallactic measure ments increases the credibility of the reports of aurorae extending down to the ground." *Subjec Headings:* **1. Low altitude auroras 2. Tromsø, Norway.**—*M.L.R.*

4J–81 551.594.5

Harang, Leiv and Bauer, W., **Ueber einen Nordlichtbogen in weniger als 80 km Höhe übe der Erde.** [On an auroral arc less than 80 km above the earth.] *Beiträge zur Geophysik*, 37(1) 109–115, **1932.** 4 figs., table, refs. German, English and French summaries p. 109. **DLC**— Parallactic film photographs were used to measure the heights of green auroral arc with dark re lower edge. Heights of 65–95 km above the ground were obtained, while a height of 80 km was th lowest previously known. The dark red edge could only be found in the lowest position of the arc *Subject Headings:* **1. Auroral arcs 2. Low altitude auroras.**—*Authors' abstract.*

4J–82 551.594.52(481

*Harang, Leiv and Tønsberg, Einar, **Investigations of the aurora borealis at Nordlys Observa toriet Tromsø 1929–1930.** *Geofysiske Publikasjoner*, Oslo, 9(5), **1932.** 50+p. 20 figs., 3 plates 3 tables, refs. **DLC**—Observations were made during the spring months of 1929 and the winter o 1929–1930 using the parallactic photography method of STÖRMER. Equipment is described an procedures used given in detail. Height measurement of auroral forms and other data are presente in extensive tables. Frequency curves of diffuse arcs and bands agree with those found by VEGAR and KROGNESS (from observations at Haldde Observatory in 1913–14) and STÖRMER (from materia collected on expedition to Bossekop in 1913, *see* 4J–46). Frequency curves of draperies and arc

ith ray structure agree with those of STÖRMER but not with VEGARD and KROGNESS (the lower nits in Tromsø have a greater value). A figure shows height distribution of the four forms as etermined by the three investigations. The most interesting feature in the frequency curves for aldde is the two pronounced maxima at 100 and 106 km—the explanation of which is uncertain. uroral photographs are reproduced. *Subject Headings:* **1. Height frequency of auroral forms Tromsø, Norway.**—*M.L.R.*

4J–83 551.508.94:551.594.5

Kalitin, N. N., **O vozmozhnosti registratsii intensivnosti poliarnykh siianii.** [Possibility of cording the intensity of aurora borealis.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, vestiia*, No. 4:25–27, **1932.** 3 figs. French summary p. 27. **DLC**—Photoelectric method can be uccessfully applied for recording aurora borealis. Experiments made with a specially designed ell with potassium combined with a camera proved the possibility of recording moonlight; since uroras are often more intense than moonlight it may therefore be assumed that the instrument, hose sensitivity can easily be increased, is appropriate for the purpose. *Subject Headings:* **1. Auoral intensities 2. Auroral recorders 3. Photoelectric meters.**—*C.K.*

4J–84 551.594.5:77

Rigby, Malcolm, **Recent research of the aurora and the work planned for the Second Interational Polar Year.** *American Meteorological Society, Bulletin*, 13(10):195–200, Nov. **1932.** refs. **WB**—Excerpts from a paper presented at a meeting of the American Meteorological Society at ullman, Wash., June 16–17, 1932. Opens with suggestions for the observation of auroras, with mphasis on the use of the Atlas of auroral forms and Scheme for visual observations of aurorae, nd describes in detail the procedure to be followed by a single observer with no camera. Next is a iscussion of auroral photography, mentioning the work of STÖRMER and his colleagues in Norway nd that being carried on under the direction of FULLER at Fairbanks. Concludes with suggestions or future research, e.g., studies in auroral frequency and the collection of auroral data in temerate zones during the summer months. *Subject Headings:* **1. Single station observation 2. Auoral photography.**—*M.L.R.*

4J–85 551.594.5

Schulze, W. M. H., **Polarlichterscheinungen in der Natur, in der Theorie und im Experiment.** Auroras in nature, theory and experiment.] *Das Weltall*, Berlin, 31(6):73–80, March **1932.** 2 figs., refs. **DLC**—A semipopular but competent summary of auroral phenomena and theories. iscusses also in more detail (with photos) BRÜCHE's experiments with a magnetic "terrella" and ery thin visible electron rays. The experiments, made in the research laboratory of the Allgemeine lektrizitätsgesellschaft, were the most extensive ever attempted for a verification of the aurora eory presented by BIRKELAND and STÖRMER. Characteristic auroral features were produced cluding the "torus space" and the effect of an electric ring current around the magnetic equator. *ubject Headings:* **1. Experimental auroras 2. Auroral theories. I. Brüche, E.**—*A.A.*

4J–86 551.594.5(98)

***The scientific results of the Norwegian Arctic Expedition in the Gjøa, 1903–1906 under the onduct of Roald Amundsen.** *Geofysiske Publikasjoner*, Oslo, v. 6, **1932.** 248 p. 6 figs., numerous ables, fold. map., refs. **DLC**—Meteorology is the title of No. 3 of this work. The observations ere arranged and reduced by AAGE GRAARUD. Observations of aurora for Nov. 1903–March 1905 p. 89–91) at Gjøahavn, and at King Point for Oct. 1925–March 1906 (p. 125–128) are tabulated ith the date and hour of observation and a brief description. *Subject Headings:* **1. Auroral data Gjøahavn, Canadian Arctic 3. King Point, Canadian Arctic. I. Graarud, Aage II. Amundsen, oald.**—*M.L.R.*

4J–87 551.594.51

Störmer, Carl, **How the horseshoe-formed auroral curtains can be explained by the corpuscular eory.** *Terrestrial Magnetism and Atmospheric Electricity*, 37(3):375–388, Sept. **1932.** 15 figs., fs., 16 eqs. **DLC**—From the equations of motion for an electron in a magnetic field the author erives the basic equation $\sin \phi = 2\gamma C/R + C^2 R/r^3$; ϕ—angle between the tangent in the direction of otion and a plane passing through the point of contact and the magnetic axis of the earth; r—istance from the dipole; $R = r \cos \phi$; $C^2 = Me/mv$; M—moment of the dipole; e, m, v—charge, ass and velocity of the electron. The expression leads to prohibited spaces for the movement of e electron and to narrow bands near the dipole (the earth). The form of the resulting aurora epends on the integration constant γ; in particular $\gamma = 0.939$ produces a horseshoe shaped curtain. *ubject Headings:* **1. Auroral theories 2. Corpuscular theory 3. Auroral forms.**—*A.A.*

4J–88 551.594.5

Störmer, Carl, **Fortschritte in der Nordlichtphotographie.** [Progress in the photography of aurora borealis.] *Physikalische Zeitschrift*, 33(14):543–544, July 15, **1932.** 2 refs. **DLC.** English version see: *Terrestrial Magnetism and Atmospheric Electricity*, 37(4):475–477, Dec. 19 4 figs. **DWB**—Brief report on instantaneous photography of auroras carried out at Tromsø German and Norwegian scientists during the winter of 1931–32. Instantaneous photographs w exposures less than one-half second were secured of even moderately bright auroras by using As RK lens and by sensitizing the plates. Reduction in time exposure made possible the permane recording of auroras in the stage of formation and eclipse; powerful lenses and sensitized plates ha made possible color photography of tranquil arcs. A portion of cinematographic film and th photographs of arcs are reproduced. *Subject Heading:* **1. Auroral photography.**—*M.L.R.*

1933

4J–89 551.594.5(

Beals, C. S., **Audibility of the aurora and its appearance at low atmospheric levels.** *Ro Meteorological Society, Quarterly Journal*, 59(248):71–78, Jan. **1933.** 12 refs. **DLC.** Abstract *Astronomical Society of the Pacific, San Francisco, Publications*, 44(260):256–257, Aug. **1932. DLC** Reviews earlier reports of these phenomena from SAMUEL HEARNE (1770) to JELSTRUP (1927) (*item* 4J-56). Then analyzes the 141 replies he received to a questionnaire sent to persons who h lived or traveled in northern Canada. Concludes that "both the sound and the low-level apparitio are real . . . though perhaps unusual accompaniments of other auroral phenomena." *Subj Headings:* **1. Auroral audibility 2. Low altitude auroras 3. Northern Canada.**—*M.L.R.*

4J–90 551.59

Dauvillier, A., **Enregistrement photoeléctrique continu des aurores polaires.** [Continuo photoelectric recording of polar auroras.] *Académie des Sciences, Paris, Comptes Rendus*, 197(1 780–781, Oct. 9, **1933. DLC**—Describes construction and use of apparatus in operation at Scores Sound during the Second International Polar Year. It records invisible aurora at full moon, dav sunset and in cloudy or foggy weather, thus making complete auroral statistics possible. Diur variation of aurora can be obtained and compared with magnetic curves. Author hopes the p cedure will be extended to cover the world. *Subject Heading:* **1. Recording photometers.**—*M.L*

4J–91 551.594.52(9

Dauvillier, A., **Observation des aurores polaires au Scoresby Sund pendant l'Année Polai** [Observation of aurora at Scoresby Sound during the Polar Year.] *Académie des Sciences, Pa Comptes Rendus*, 197(18):997–1000, Oct. 30, **1933. DLC**—Gives methods of observation and sc of intensity used. Results show that the aurora was nearly permanent during the auroral ye A marked diurnal variation in frequency was found with principal maxima at 21 h and second maxima at 4 h 30 min, local time. On dividing day into two periods of 12 hrs each, the mean aur frequency is about the same. The curve of auroral activity in agreement with that of magne activity, indicates an irregular variation in the last quarter of 1932 but a very regular periodicity the early months of 1933. *Subject Headings:* **1. Diurnal auroral frequencies 2. Auroral-magn periodicity 3. Scoresby Sound, Greenland.**—*From Science Abstracts, No. 568, Feb. 1934.*

4J–92 551.594.5(

Davies, Frank T. and Currie, Balfour W., **Audibility of the aurora and low aurora.** *Nat* London, 132(3344):855–856, Dec. 2, **1933. DWB**—The Canadian Polar party stationed n Chesterfield Inlet on the west coast of Hudson Bay questioned white people and Eskimos as to audibility of auroras. According to the evidence, the region of maximum audibility corresponds the region of maximum auroral frequency. No distinction was made between objective or s jective explanation of the sounds. The validity of the testimony of the natives is debatable. O one member of the party heard any sound during an aurora. Offers an explanation to those peo who claimed that they had walked in an aurora. On three occasions, following active displays auroras with ray structures, the whole sky, except for a small area in the north, was covered wit continuous auroral glow. The light from this glow with the light reflected from the snow gave the effect of being in an auroral mist or fog. *Subject Headings:* **1. Low altitude auroras 2. Aur audibility 3. Chesterfield Inlet, Canadian Arctic.**—*M.L.R.*

4J–93 551.594.5(4

Oddie, B. C. V., **Some observations of aurora made at the Alten Copper Mines, Lapland, in years 1839–1849.** *Royal Meteorological Society, Quarterly Journal*, 59(252):399–400, Oct. 19 **DLC**—Not only auroras, but magnetic declination and meteorological elements (thrice daily every half hour one day in the month) were observed at the observatory at Alten (lat. 69°58'

ng. 23°43′E.). Quotations from manuscript book of observatory show that auroras were bril-ıntly colored and observers believed their normal height to be a few thousand ft or less and oc-ısionally (3 times) to be accompanied by sound. *Subject Headings:* **1. Low altitude auroras Auroral audibility 3. Alten, Norwegian Lapland.**—*M.L.R.*

4J–94 551.594.5

Simpson, Sir G. C., **Low auroras.** *Royal Meteorological Society, Quarterly Journal*, 59(249):185–90, April **1933. DWB.** Review in: *Nature*, London, 131(3319):828–829, June 10, **1933. DLC**—omments on pamphlet by JOHNSON (*see item* 4J–67) and articles by CHAPMAN (*see item* 4J–80), nd BEALS (*see item* 4J–89) in which they offer evidence that auroras occur near the earth or are udible or that it is difficult to believe that they are not audible or close to the earth. SIMPSON elieves that those whose views differ from the above should express them as clearly and strongly as ossible. This paper is an attempt to do just that. The author rejects the evidence of the above entioned for 2 reasons: 1) because he would have to deny the facts that he, a physicist, has learned y a study of auroras at both ends of the earth and 2) because he is able to give more satisfactory xplanations of all the phenomena observed. His first reason is based on his knowledge of the physics aurora and the principles of perspective and for the second he offers the explanation of optical usion. *Subject Headings:* **1. Low altitude auroras 2. Auroral heights.**—*M.L.R.*

1934

4J–95 551.594.5:77

Chapman, Sydney, **A mechanical optical method of reduction of auroral plates.** *Terrestrial Magnetism and Atmospheric Electricity*, 39(4):321–323, Dec. **1934. DLC**—The method suggested ere is one in which the situation at the time of photographing is reproduced on a reduced scale. his reproduction may be obtained by placing the photographic plates in projectors the optical enters of whose lens system occupy points corresponding to the optical centers of the original ameras. These projectors must be capable of movement in any direction. The method of setting e projectors in the proper direction with the aid of a framework respresenting the celestial sphere portion of it, is discussed. With the projectors set the next point considered is the reproduction coincident images of identifiable points of the aurora from the two. As the method does not produce the original optical situation for each camera the author points out that identification of fferent parts of the aurora involves adjustments of focus of the projectors. A great advantage the method over that at present in use, consists, in the author's opinion, in the fact that the entification of common points in the two auroral images is made at the last possible stage and ot at the first. *Subject Headings:* **1. Auroral photography 2. Reduction of pairs of auroral plates Parallactic photography.**—*Science Abstracts, No. 1541, April 1935.*

4J–96 551.594.5(485)

*Corlin, Axel, **Catalogue of aurorae boreales observed in northern Sweden during the time ugust 1932–March 1933.** (*K.*) *Svenska Vetenskapsakademien, Stockholm, Handlingar, Ser. 3,* 3(6), **1934.** 51 p. 6 tables, refs. **DCI-T**—Observation of aurora was one of the chief objects the International Polar Year work at the Geophysical Observatory at Abisko (geogr. lat. +68°21′, eomagn. lat. +66°5′) which is only a few degrees south of the zone of maximum auroral frequency. ork consisted of photography, drawing upon star maps and visual observation. The meteorological bservatory of Riksgränsen, 30 km N.W. of Abisko, was used as the subsidiary station for double-ation photography. Included in the catalog are observations made by the night watchmen of the on ore mines at Kiruna. The catalog lists month, day, year, mean European time, form, azimuth, titude, intensity, place of observation and observer and simultaneously recorded ionization caused y cosmic ultra-radiation for every aurora (over 700) observed. Among the tables is one showing onthly frequency of auroral forms. *Subject Headings:* **1. Auroral catalogs 2. Auroral frequencies Abisko, Sweden.**—*M.L.R.*

4J–97 551.594.52(98)

Currie, Balfour Watson, **Summary of some auroral height measurements and observations Chesterfield, Canada.** *Terrestrial Magnetism and Atmospheric Electricity*, 39(4):293–297, Dec. 934. 7 figs. **DLC**—Report on the work of the Canadian International Polar Year party at hesterfield Inlet (63°20′N., 90°42′W.) and a subsidiary station on the coast of the Hudson Bay. ngle station visual observations, single station photographs of the brighter displays and double-ation photographs for height measurements were made. Equipment and procedures described. f the 1000 photographs taken, about ⅔ were useful for height measurements. Measurement of 200 arallactic photographs showed the distribution of heights to be similar to those found in Norway. istribution of auroral heights and nightly variation in number of auroral forms for clear nights ly for Chesterfield are presented in graphs. Photos of the stations and of auroral forms are produced. *Subject Headings:* **1. Auroral heights 2. Chesterfield Inlet, Canadian Arctic.**—*M.L.R.*

4J–98 551.594.52(74

Kelley, Floyd C., **Audibility of auroras and low auroras.** *Nature*, London, 133(3354):21 Feb. 10, 1934. **DWB**—Observation of an aurora at Hartford, Conn. during the winter of 1908 1909. The light effects gave the impression of a fog being illuminated by playing a searchligh back and forth. The word "swishing" described the sound which was heard while the lights wer changing. *Subject Headings:* **1. Low altitude auroras 2. Auroral audibility 3. Hartford, Conn.**—*M.L.R.*

4J–99 551.594.5 550.3

Larmor, Joseph, **Aurorae, electric echoes, magnetic storms.** *Nature*, London, 133(3354):221 223, Feb. 10, 1934. 7 refs., eqs. **DLC**—Reference is made to the results obtained by APPLETO and others regarding the complex connections between the optical and magnetic phenomena of th upper atmosphere, and consideration is given to electron densities required in the reflecting layer t provide reflection by rays following vertical or oblique paths. A scheme is next introduced in whic it is assumed that the aurora is due to lasting local pulsations on a large scale, of long period, excite by a local cause, large enough and of abrupt type, produced conceivably by arrest high up of a ionized torrent from outside sufficiently concentrated to require relief by propagation in waves This could give the banded auroral curtains with spiralling transmission along the magnetic field The splitting by the earth's magnetic field of the radiation into two cyclic components is examine for magnetic fields along the transverse to the waves and the methods by which these component could be verified. Finally, the effects of Hamiltonian group velocity and transition between energ levels are discussed. *Subject Heading:* **1. Auroral magnetic relationships.**—*Science Abstracts, No 1539, April 1934.*

4J–100 551.594.52(481

Störmer, Carl, **Über eine Nordlichtexpedition nach Trondheim im März 1933.** [On an auror expedition to Trondheim in March 1933.] *Beiträge zur Geophysik*, 4(1):382–386, **1934.** fig 4 plates (after p. 400), refs. **DLC**—Using Trondheim and Lokken as base stations (48 km apart) 465 parallactic photographs were secured. Details of the types of auroras are given. Height o sunlit auroras, not visible to the eye, were between 250 and 450 km. Record of magnetic activit at Tromsø for Jan.–April and aurora photographs are included. *Subject Headings:* **1. Aurora heights 2. Sunlit auroras 3. International Polar Year, 1932–1933 4. Norway.**—*M.L.R.*

1935

4J–101 551.594.5

Davies, Frank T., **The variation in magnetic and auroral activity of three high latitude stations** *Terrestrial Magnetism and Atmospheric Electricity*, 40(2):173–182, **1935.** 9 figs., 2 tables, 2 refs **DLC**—Data from the Byrd Antarctic Expedition Station at Little America, 1929–30; the United States Polar Year Station at Barrow, Alaska, 1932–33; and the Canadian Polar-Year Station a Chesterfield, Northwest Territory, Canada, 1932–33 were used for the purpose of comparing diurna magnetic and auroral activity. Locations of the stations are shown in a table and on a chart Data shown graphically. *Subject Headings:* **1. Diurnal aurora variations 2. Diurnal magneti variations.**—*M.L.R.*

4J–102 551.594.5(481

*Störmer, Carl, **Measuring of aurora with very long base lines.** *Geofysiske Publikasjoner* Oslo, 11(3), **1935.** 15+p. 16 figs., 2 plates, tables, refs. **DLC**—The locations of the photographi stations are shown on a chart. The longest base line, 385 km, was from Kongsberg to Løkken Verk Photographs were taken simultaneously at 2 or more stations. Using the aurora of Aug. 27, 193 as an example, explains briefly the method of interpreting the photographs, using first Kongsber and then Løkken Verk as the main station. Data are presented in tables and diagrams. Th aurora of Jan. 27, 1935 is used to show the heights of several points on the same aurora. Autho concludes that by using long base lines, exact measurements can be obtained even for diffuse arc and patches; for well-defined auroral forms the error can be less than 1%. Diagrams show geo graphical position. *Subject Headings:* **1. Auroral heights 2. Auroral photography networks 3. Nor way.**—*M.L.R.*

4J–103 551.594.5(02

Wegener, Alfred Lothar and Wegener, Kurt, **Das Polarlicht.** [The aurora.] (In: **Vorlesunge über Physik der Atmosphäre.** Leipzig, Barth, **1935.** p. 211–218. figs., refs.) **DLC**—The chapte on the aurora in this famous text gives in concise form the latest theories of the origin of the auror and its various forms, the intensity, height, methods of measuring the height, the spectrum and it implications as to the composition of the ionosphere. *Subject Headings:* **1. Auroras 2. Auror spectra 3. Textbooks.**—*M.R.*

1936

4J–104 551.594.5:550.38(99)

Ennis, C. C., **Relationship between auroral and magnetic activities at Little America, First Byrd Antarctic Expedition, 1928–1930.** *Terrestrial Magnetism and Atmospheric Electricity*, 41(1):45–55, March **1936.** 4 figs., 7 tables. **DWB**—Instead of correlating coincident values of auroral intensity and of magnetic declination only, as was done in prior investigation by the author, use is made of corresponding values of horizontal intensity also. The "disturbing force" (amount and direction) is computed for each half-hour during the day for June, July, and Aug. (incomplete) from "normal day" departures of observed values of declination and horizontal intensity. The results are classified according to the presence or absence of aurora. Represented by a series of graphs, they show interesting contrasts and similarities with respect to the two classes. Of special note is an outstanding post-midnight maximum in the disturbing force occurring consistently, from the standpoints of time and magnitude, but only when aurora are present and at a time of day when auroral intensity is about its daily maximum. Another feature revealed by vector-diagrams of the disturbing force is the two-loop, day and night characteristic. *Subject Headings:* **1. Auroral magnetic relationships 2. Little America, Antarctica.**—*Author's abstract.*

4J–105 551.594.5

Eve, Arthur Stewart, **Northern lights.** *Smithsonian Institution. Annual Report*, **1936** (pub. 1937). p. 145–160. 3 figs., 5 plates. **DLC**—Considers the following topics: nature of the lower air and the passage of an electric charge through it; the upper atmosphere and the auroral displays which occur there due to the rarified state of the air; the height, forms, audibility and spectra of auroras; various methods used to determine the composition and structure of the upper atmosphere and the relationships between sunspots, auroras and magnetic storms. *Subject Headings:* **1. Auroras 2. Upper atmosphere.**—*M.L.R.*

4J–106 551.594.5(481)

*Krogness, O. and Tønsberg, Einar, **Auroral and magnetic measurements from observations of Haldde Observatory.** *Geofysiske Publikasjoner*, Oslo, 11(8), **1936.** 21+p. 6 figs., 3 tables, 2 plates, 13 refs. **DLC**—First part deals with height measurement of auroras photographed at Haldde and Bossekop. Table I based on 100 parallactic photographs taken in 1914 and 1915 gives date, time of exposure, auroral form, mean height above sea level, upper and lower limits, etc.; Table II shows height distribution for different auroral forms. Second part is concerned with "auroral clouds" and a figure illustrates their displacements in magnitude and direction. The third part gives briefly the absolute magnetic measurements at Haldde. *Subject Headings:* **1. Auroral heights 2. Auroral clouds 3. Height distribution of auroral forms 4. Haldde Observatory, Norway.**—*M.L.R.*

4J–107 551.594.5(481)

Vegard, Lars, **Red and sunlit auroras and the state of the upper atmosphere.** *Nature*, London, 138(3500):930, Nov. 28, **1936.** ref. **DLC**—On Oct. 16, 1936 a strong auroral display was observed at Oslo. It began as an arc fairly low in the northern sky, but at intervals it took the form of a drapery-shaped band with pronounced ray structure, and sometimes—for example between 22 h and 23 h—rays of quite unusual length (several 100 km) were observed. These observations show that extremely long rays may appear also on the night side of the earth, and that they are not restricted to regions exposed directly to sunlight. *Subject Headings:* **1. Sunlit auroras 2. Oxygen lines 3. Oslo, Norway.**—*Edward V. Ashburn.*

1937

4J–108 551.594.5(266)

Barker, Sir David Wilson, **Aurora australis.** *Royal Meteorological Society, Quarterly Journal*, 63(272):470, Oct. **1937.** **DLC**—Quotation from author's log in which he describes auroral display on Nov. 8, 1881, observed at lat. 50°52′S., long. 160°40′W. Appeared intermittently on southern horizon as vertical white streamers—sometimes tinged red or pink and slightly phosphorescent. *Subject Headings:* **1. Aurora australis 2. South Pacific.**—*M.L.R.*

4J–109 551.594.5(411):550.38

Beck, J. B. and Rhead, D. W., **Aurorae at Eskdalemuir, April 25th–28th and May 4th, 1937.** *Meteorological Magazine*, London, 72(857):115–117, June **1937.** graph. **DWB**—Brief descriptions of auroras and associated magnetic disturbances (April 26–27). Auroras of April 25–28 were observed under a full moon, with visibility over 18 mi and practically no cloud. Auroral forms seen were: arcs, streamers, curtains, draperies, bands, coronas and rays. The auroras of April 25 and 26 showed the greatest variety of form and color. A reproduction of the magnetic traces shows

considerable disturbances on April 26–27. *Subject Headings:* **1. Auroras 2. Auroral forms 3. Magnetic disturbances 4. Eskdalemuir, Scotland.**—*M.L.R.*

4J–110 551.594.52:551.547

*Egedal, J., **La haute atmosphère et les aurores.** [The high atmosphere and auroras.] *La Météorologie*, 3rd Ser., p. 301–303, July/Aug. **1937.** table. **DWB**—A table is presented which gives the mean height of auroras of several types (Norway, 1913–14) according to the number of hours after sunset ($2\frac{1}{2}$–$2\frac{1}{2}$, $2\frac{1}{2}$–$3\frac{1}{2}$, $3\frac{1}{2}$–$4\frac{1}{2}$, etc.), in order to see if there is any raising or lowering of the height which would correspond to a raising or lowering of pressure in the upper atmosphere (assuming that rays of equal intensity penetrate to an equal pressure surface) as the sun's influence in the temperature of the upper air decreases. It was found that for rays the mean height decreases from 165 km to 99 km from 3 hours after sunset to 3 hours before sunrise. *Subject Headings:* **1. Auroral height frequencies 2. Upper air pressure.**—*M.R.*

4J–111 551.594.5:551.506.3(798)

*Fuller, Veryl Richards and Bramhall, Ervin Hicks, **Auroral research at the University of Alaska, 1930–1934.** *Alaska. University, Miscellaneous Publications*, v. 3, **1937.** 130 p. figs., tables, refs. *Alaska University. Geophysical Institute, Miscellaneous Reprint*, No. 1. **DLC**—The introduction contains a brief sketch of research on auroras and an account of the founding of the auroral station at College. Chap. I–III, by FULLER, are reprinted from *Terrestrial Magnetism and Atmospheric Electricity*, Dec. 1931, June 1932, Sept. 1933 and 1935. Data for the period from Aug. 9, 1930 to May 7, 1931 are tabulated in Chap. I and for the period from Oct. 31, 1931 to April 1932 in Chap. II. Visual observations for the period from Aug. 1932 through Dec. 31, 1934 are summarized in Chap. III. The remaining chapters were written by ERVIN H. BRAMHALL, who continued the work after FULLER's death. A table in Chap. V shows data calculated from parallactic photographs made from Oct. 1932 to Dec. 1934. A number of reproductions of auroral photographs will be found in the same chapter. Among the conclusions (Chap. VI) from visual observations are these: a) a more or less regular sequence of times of maximum and minimum displays occurs, b) no significant sequence in diurnal variation of displays could be detected, c) nearly all displays started with a quiet homogeneous arc about 30° east of north and d) the movement of rays was usually easterly; results of photogrammetric measurements of 70 pairs of photographs placed the majority of the auroral points between 95 and 120 km (for Jan. 1930–April 1932) while additional data on 80 pairs (Nov. 1932–Dec. 1934) show the greatest number of points between 100 and 110 km. These measurements show that auroras commonly occur at a lower altitude in Alaska than in Norway. *Subject Headings:* **1. Auroral research 2. Auroral heights 3. College, Alaska.**—*M.L.R.*

4J–112 551.594.52(931)

*Geddes, M., **The position of New Zealand aurorae.** *New Zealand Journal of Science and Technology*, 19(1):55–62, June **1937.** 3 figs., 2 tables, 5 refs. **DLC**—Report of observational work carried out by the Aurorae and Zodiacal Light section of the New Zealand Astronomical Society to determine the zone in which the majority of New Zealand auroras occur. Gives heights adopted for 4 auroral types (HA, RA, R and L) according to usual classification. A table gives heights and distances of 13 observed auroras based on single observations. Author concludes that New Zealand is more favorably situated for the study of auroras than are other habitable land masses in the Southern Hemisphere. (*Same item as* 4D–81, April 1953, *MAB.*) *Subject Headings:* **1. Aurora australis 2. Auroral heights 3. New Zealand.**—*M.L.R.*

4J–113 551.594.52(481):77

*Harang, Leiv, **Height measurements of selected auroral forms.** *Geofysiske Publikasjoner*, Oslo, 12(1), **1937.** 31 p. 46 figs., tables, plate, refs. **DLC**—Paper is based on observations carried out at Tromsø between 1930 and 1936. More than 700 pairs of photographs were calculated, the positions in the figures being based on 286 pairs. Following a brief review of the methods of photography and reduction of photographs, author first discusses cases of aurora in dark atmosphere, then in greater detail the various forms (rays, arcs, bands, draperies, etc.) of sunlit aurora, many of which were observed during Feb. 1936. Paper concludes with a discussion of the variation of heights of aurora when passing from sunlit to dark atmosphere and the temperature of the atmosphere at these heights. *Subject Headings:* **1. Auroral heights 2. Sunlit auroras 3. Auroral photography 4. Tromsø, Norway.**—*M.L.R.*

4J–114 551.594.5

*Haurwitz, B., **The physical state of the upper atmosphere.** *Royal Astronomical Society of Canada, Toronto, Journal*, 30(8,9,10):315–330, 349–366, 397–415, Oct., Nov., Dec., **1936;** 31(1,2):19–42, 76–92, Jan., Feb. **1937.** 30 figs., 11 tables, bibliog. p. 85–92, 48 eqs. **DLC**—Pt. 7 (p. 397–415, Dec. 1936) entitled "The aurora" covers the following subjects: geographical distribution, height,

spectrum, and theories regarding the origin of auroras, with emphasis on the last. Here the work of Störmer and Birkeland, Krogness and Vegard, Brüche and Chapman and Ferraro, etc. is reviewed. *Subject Headings:* **1. Auroral theories 2. Auroral distribution 3. Auroral heights 4. Auroral spectra.**—*M.L.R.*

4J–115 551.594.5

†Hewson, E. W., **A survey of the facts and the theories of the aurora.** *Reviews of Modern Physics*, 9(4):403–431, Oct. **1937.** 22 figs., 81 refs., eqs. **DLC**—A summary covering the following topics: auroral forms, geographic distribution, methods of measuring height and intensity, comparison of ordinary and sunlit auroras, auroral spectrum and auroral theories. *Subject Heading:* **1. Auroras.**—*M.L.R.*

4J–116 551.594.5(98,99)

O'Neill, Harold Edgar, **The auroral drama.** Aurora, Mo., Burney Bro's., **1937.** 317 p. **DLC**—A carefully compiled collection of facts and opinions regarding the aurora, taken from personal experience and from contacts with numerous authorities on the Arctic and Antarctic, on meteorological and atmospheric electricity phenomena. Much is in the category of adventure rather than science, but the material is systematically organized and the opinions carefully weighed. (*Same item as* 3.2–196, Feb. 1952, *MAB.*) *Subject Headings:* **1. Auroras 2. Arctic 3. Antarctica.**—*M.R.*

4J–117 551.594.5(481)

Störmer, Carl, **Divided aurora rays with one part in the sunlit and another in the dark atmosphere.** *Nature*, London, 140(3556):1095–1096, Dec. 25, **1937.** 3 figs., 2 refs. **DLC**—Report of aurora of Oct. 11, 1937, photographed from 8 stations in southern Norway. Some of the aurora pictures are of particular interest because they show high aurora rays divided by a dark space where the rays are penetrating the boundary between sunlit and dark atmosphere. This rather rare phenomenon was also observed on March 15–16, 1929 (see *Nature*, June 8, 1929). Spectrum taken of the sunlit rays of Oct. 11, 1937 showed the 6300Å line the strongest, next came the 5577Å, 6550Å lines as in the spectrum obtained on Oct. 16, 1936 (*Nature*, 139: 84, April 3, 1937). *Subject Headings:* **1. Sunlit auroras 2. Auroral spectra 3. Southern Norway.**—*M.L.R.*

1938

4J–118 551.594.5(42)

Aurora of January 25–26. *Nature*, London, 141(3561):192, Jan. 29, **1938. DLC.** Also: **The aurora of January 25–26.** *Ibid.*, 141(3562):232–235, Feb. 5, **1938. DLC**—Additional accounts of this aurora, noted not only for its brilliance but for the wide area over which it was observed. The first description comes from Hertfordshire. Three periods of brilliant display were noted and its chief features described (red, green and white coloration). The second article contains reports from four other localities as well. At Kew no green coloration was seen. In Somerset a rosy glow in the NNW was first observed and later pale green streamers. At the period of maximum brilliance a rose colored arc nearly 90° broad was seen above a greenish arc at an elevation of about 45°. The display was seen early on the morning of Jan. 26 at Cambridge. It exhibited a bright greenish glow behind banded cirrus clouds across the northern horizon and 2 parallel bands of delicate pink to the NW. From time to time short groups of rays developed in the bands. The pink coloration spread to the SE where it appeared as a dark red patch, due to lack of illumination in the background. *Subject Headings:* **1. Aurora of Jan. 25–26, 1938 2. Auroral coloration 3. England.**—*M.L.R.*

4J–119 551.594.5(42)

Barlow, E. W., **The aurora of January 25th–26th, 1938.** *Meteorological Magazine*, London, 73(865):9–14, Feb. **1938.** 2 figs. **DLC.** Also: Barlow, E. W., Chapman, Sydney and Evershed, J., **The auroral display of January 25–26, 1938.** *Royal Meteorological Society, Quarterly Journal*, 64(275):215–221, April **1938. DLC**—The first report states that the display, accompanied by the most intense magnetic storm recorded at Greenwich since 1909, was the finest in the past 50 years and was noted for its duration, continuous change, variety of forms and magnificent colors. A drawing shows position and structure at 2205 on Jan. 25 with red and orange rays, greenish arc and a cloud formation against a background of constellations. In the second report the widespread occurrence of aurora—British Isles, Europe, North Atlantic, Eastern Canada and as far south as Madeira and Bermuda as well as in lat. 34°54′S., long. 70°23′E. is noted. The activity of the aurora, as observed in Sussex, showed 8 definite periods. Arcs and rays are described in detail. *Subject Headings:* **1. Aurora of Jan. 25–26, 1938 2. Auroral forms 3. Magnetic storms 4. Low latitude auroras 5. England. I. Chapman, Sydney II. Evershed, J.**—*M.L.R.*

4J–120 551.594.5(439.

Berkes, Zoltán and Flórián, Endre, **Sarkifény Magyarországon 1938. január 25–26-án.** [Auror in Hungary on Jan. 25–26, 1938.] *Időjárás*, 42(5/6):117–123, May 1938. 4 figs., 4 refs. Germa summary p. 145. **DLC**—This contribution to the rich observational material available for th intense auroral activity of Jan. 25–26, 1938 comes from a country where auroras are rarely see In a summary, based on some 200 individual eye-witness reports, drawings and photographs, th general development of the phenomenon is described. From 8:15 p.m. Jan. 25 to 3:30 a.m. Jan. 2 a total of 7 displays were observed, two of them with a luminosity unprecedented in Hungary sinc 1870. The location of the aurora is put between 50 and 55°N lat at a height of 200–300 km. A companying magnetic disturbances, radio propagation anomalies and static are mentioned. Earli observations of auroras in Hungary are listed. Auroral theory is reviewed briefly. *Subject Heading* **1. Aurora of Jan. 25–26, 1938 2. Löw latitude auroras 3. Hungary.**—*G.T.*

4J–121 551.594.5:599.9:159.

Botley, Cicely Mary, **Some human reactions to the great aurora of January 25–26, 1938.** *Roy Meteorological Society, Quarterly Journal*, 64(276):449–450, July 1938. ref. **DWB**—Enumerat some of the psychological reactions to aurora of Jan. 25–26, 1938. In Yugoslavia, peasants fell o their knees; in England, many people believed that the light in the sky came from a fire and a American visiting in England said it was worth the journey from Philadelphia just to see the auror Author adds that an auroral display may have been the inspiration for some of the lines in the las scene of Marlowe's "Dr. Faustus" and for the scene in Wagner's "Twilight of the Gods" whe Valhalla is destroyed. *Subject Headings:* **1. Aurora of Jan. 25–26, 1938 2. Psychology.**—*M.L.R.*

4J–122 551.594.5(493):550.3

De Backer, S., **L'aurore boréale du 25–26 janvier 1938.** [The aurora of Jan. 25–26, 1938. *Ciel et Terre*, 54(4):113–138, April **1938.** 2 figs., 16 plates, 48 refs. **DLC**—After a general discussio of the auroral phenomenon (classification, geographical and temporal distribution, height, intensity spectrum, theories, observations in East Greenland during the Polar Year 1932–1933), the auth gives a collection of eye-witness notes on observations in various countries (from Norway to Morocc and particularly in Belgium of the unusually intense auroral activity of Jan. 25–26, 1938. Detai of accompanying geomagnetic disturbances (magnetogram obtained at Manhay, Belgium, is pr sented and analyzed), of solar activity and of radio wave propagation disturbances are include *Subject Headings:* **1. Aurora of Jan. 25–26, 1938 2. Magnetic disturbances 3. Belgium.**—*G.T.*

4J–123 551.594.52(41

Dixon, Frederick E., **Auroral notes.** *Meteorological Magazine*, London, 72(862):237–23 Nov. **1937;** 73(874):278–279, Nov. **1938. DWB**—1) Auroral displays were observed on 12 nigh in Sept. 1937 chiefly in Scotland. Aurora observed as far south as Holyhead and Boscombe Dow early on the morning of Sept. 11; an exceptionally bright aurora at Duntuln, Skye, on Sept. 30; th finest aurora in many years at Shetland on the night of Oct. 3–4, 1937. 2) Between Aug. 1937 an May 1938, 108 auroral displays, the highest total since 1929–30, were seen in Scotland and the numb of occurrences in Aug., Sept. and Oct. 1938 were above average. Place, time and some features these auroras (37) are noted. In Scotland auroras are seen most frequently in Oct. *Subject Hea ings:* **1. Auroras 2. Auroral distribution 3. Scotland.**—*M.L.R.*

4J–124 551.594.5(4

Guerrieri, Eugenio, **La grande aurora boreale del 25–26 gennaio 1938—XVI. Connessione t aurore polari, Macchie solari e perturbazioni elettro-magnetiche.** [The great aurora borealis Jan. 25–26, 1938. Connections between solar auroras, sunspots and electromagnetic perturbations *Naples. Osservatorio Astronomico di Capodimonte, Contributi Astronomici, Ser. II*, No. 22:245–26 **1938.** refs. **DWB**—This article presents in an organized manner the essence of numerous repor from Europe, North America, Africa and the Southern Hemisphere, together with notes on th spectra, magnetic effects, height, intensity, color, sunspot relations, etc. Particularly detaile accounts of observations in Italy given. *Subject Headings:* **1. Aurora of Jan. 25–26, 1938 2. Lo latitude auroras 3. Italy.**—*M.R.*

4J–125 551.594.51(94):550.3

Higgs, A. J. and Giovanelli, R. G., **Recent solar eruptions, auroras and magnetic storm** *Nature*, London, 141(3573):746, April 23, **1938.** 4 refs. **DLC**—Refers to discussion of aurora Jan. 25–26, 1938 (*Nature*, Feb. 5, 1938, *see* 4J–118 above). On Jan. 24, 1938 a prolonged sol eruption and one of the severest short-wave radio fadeouts ever recorded at the Observatory we observed at the Commonwealth Solar Observatory, Canberra. Observations with the spectr helioscope continued from 0512 until 0700 GMT, no abrupt changes in intensity corresponding the maxima observed in the aurora were noted. The short wave radio fadeouts began at 025

rom previous experience, authors believe the large solar eruption first seen at 0512 actually began few minutes before 0250 GMT and that the unusual aurora of Jan. 25 was connected with the rolonged period of solar activity beginning about 0250, rather than with a later eruption which ccurred after sunset at Canberra. The interval between the beginning of the earlier eruption and ommencement of the auroral display was 39 hrs, the beginning of the eruption and the outbreak f the magnetic storm was 33 hrs (considerably longer than the average 26 hrs for the interval etween solar eruptions and corresponding magnetic storms and auroras). "It would thus appear hat the projection of particles at small angles to the sun's surface is considerably less than along he normal." *Subject Headings:* **1. Auroral magnetic relationships 2. Aurora of Jan. 25, 1938 . Auroral solar relationships 4. Canberra, Australia.**—*M.L.R.*

4J–126 551.594.5(495)

Maltézos, C., **L'aurore boréale du 25–26 Janvier 1938.** [The aurora borealis of Jan. 25–26, 938.] *Akademia Athēnōn, Praktika*, 13:269–278, **1938.** fig. Abstracted from reprint. **DWB**—Reports on this extensive aurora (seen as far south as Crete) are mentioned in the introduction, nd the fact noted that there was not one report of an aurora having been seen in Athens from Oct. 5, 1870 until Jan. 25, 1938 (67 years), though all the records were checked against dates of great uroras in other low latitude locations. Detailed reports from over 15 places in Greece, describing orms, time, colors (red was reported from most places) and other manifestations, including alarm aused because of mistaken belief that a great fire or battle was taking place on the borders, resulting n dispatching troops to the area, are presented. A violent magnetic storm was noted. *Subject Headings:* **1. Aurora of Jan. 25–26, 1938 2. Low latitude auroras 3. Auroral coloration 4. Greece.**—*M.R.*

4J–127 551.594.5(42)

Smith, G. Thornton; Slow, Mildred and Dyson, J. H., **The aurora of May 11th–12th, 1938.** *Meteorological Magazine*, London, 73(869):121–122, June **1938. DWB**—Smith's observation was nade at Hucknall, Nottinghamshire, between 23h 40m and 23h 55m GMT on May 11. The display asted about 8 min and was characterized by rosy pink sky between brilliant white streamers in the north and northeast sector of the sky. At about 0h 55m, Miss Slow observed two bright carmine patches of haze and noted a pronounced "electric feeling." Dyson observed the aurora at Preston, Canterbury. He describes briefly 11 periods of auroral activity. Arcs, rays and streamers as well as a variety of colors were seen. *Subject Headings:* **1. Aurora of May 11–12, 1938 2. England.**—*M.L.R.*

4J–128 551.594.52(481)

Störmer, Carl, **Photographische Höhenmessungen und Spektra des grossen Nordlichtes vom 25. bis 26. Januar 1938.** [Photographic height measurements and spectra of the great aurora of Jan. 25–26, 1938.] *Naturwissenschaften*, 26(39):633–638, Sept. 30, **1938.** 8 figs., tables, refs. **DLC.** For shorter version see: *Nature*, London, 141(3578):955–957, May 28, **1938.** 2 figs. **DLC**—This aurora was photographed from 9 stations in southern Norway. From about 1390 photographs, 710 were successful. About 20 spectra were also secured. Measurements of two of the sets gave these results: 1) with the base line Oscarsborg-Tömte (73.7 km)—lower border of green arc about 95 km, base points of rays from 150 to 200 km, summits from 500 to 600 km; 2) with the base line Askim-Lillehammer (173 km)—base points of the rays were found to be between 106 and 108 km, summits from 500 to 530 km. All these rays were lying in the earth's shadow. Two accounts are given of sounds heard. A photograph of the aurora taken at Tömte and a chart showing the geographical situation of the rays are included. *Subject Headings:* **1. Auroral heights 2. Auroral spectra 3. Aurora of Jan. 25–26, 1938 4. Southern Norway.**—*M.L.R.*

4J–129 551.594.52(481)

*Störmer, Carl, **Some results regarding height and spectra of aurorae over southern Norway during 1936.** *Geofysiske Publikasjoner*, Oslo, 12(7), **1938.** 42+p. 8 figs., 2 tables, 12 plates. **DLC**—This paper gives extensive data for the auroras of April 20–22 and Oct. 16–17. The positions of the auroras are shown in diagrams and many photographs are reproduced. *Subject Headings:* **. Auroral heights 2. Auroral spectra 3. Southern Norway.**—*M.L.R.*

4J–130 551.594.5(47)

*Tikhomirov, Evgeniĭ Ivanovich, **Geofizicheskie issledovaniia v Sovetskoĭ Arktike.** [Geophysical investigations in the Russian Arctic.] *Problemy Arktiki*, No. 3:43–69, **1938.** 25 tables, 2 charts. **DLC**—Statistical data on frequency of aurora borealis for 17 stations in Russian Arctic are given on p. 69. *Subject Headings:* **1. Auroral frequencies 2. Soviet Arctic.**—*N.A.S.*

4J–131 551.594.5(261,26)

Vring, E. v. d., **Das Nordlicht am 25. Januar, 1938.** [The aurora of January 25, 1938] *Der Seewart*, Hamburg, 7(6):174–179, **1938.** fold chart (after p. 188). **DLC**—Reports from 3 ships (various nationalities) in the North Atlantic and Mediterranean. Time of observation location of the display and brief descriptions are given. Map shows location of each ship at time observation. *Subject Headings:* **1. Aurora of Jan. 25, 1938 2. North Atlantic Ocean 3. Mediterranean Sea.**—*M.L.R.*

4J–132 551.594.5(411):7

Walker, Sir Gilbert Thomas, **Auroral photography.** *Royal Meteorological Society, Quarterly Journal*, 64(276):476, July **1938.** fig. **DLC**—Quotes from JAMES PATON on beginning made by him and G. V. BLACK to photograph an aurora from two bases simultaneously in order to secure useful and reliable information on the height of auroras. A photograph of the aurora of March 26, 1938 taken at Bornton, 5 mi WNW of Edinburgh is reproduced and a description of the aurora is included. *Subject Headings:* **1. Auroral photography 2. Bornton, Scotland.**—*M.L.R.*

1939

4J–133 551.594.52(71

*Alty, T. and Wilson, F. J., **Measurements of the height of the aurora borealis at Saskatoon, Canada, 1932–33.** (In: Canada. Meteorological Div., **Canadian Polar Year Expeditions 1932 33** v. 2. Ottawa, J. O. Patenaude, **1939.** p. 131–149. tables, figs., photos, refs.) **DLC**—For measurements of heights of auroras, photographs were taken simultaneously at Saskatoon (lat. 52 N. long. 107 W.) and Meunster, 112.46 km distant. Visual observations were also made daily at 1 4 and occasionally at 7 GMT. The data obtained for each type of observation are tabulated. The following results are noted: 1) maximum frequency observed in western Canada agrees very closely with that found by STÖRMER (100 km and 106 km) and 2) the height of the lowest aurora is lower than that given by STÖRMER. Measurements were also made of long ray structures—one extending from an upper limit of 336 km to a lower limit of 71 km. The apparatus used and method of calculation are described briefly. A number of photographs are reproduced. *Subject Headings:* **1. Auroral heights 2. Saskatoon, Canada.**—*M.L.R.*

4J–134 551.594.52(71

*Currie, Balfour Watson, **A report on auroral height measurements and observations at Chesterfield Inlet, Canada.** (In: Canada. Meteorological Div., **Canadian Polar Year Expeditions. 1932–33.** v. 2. Ottawa, J. O. Paternaude, **1939.** p. 150–185. figs., tables, 5 refs.) **DLC**—Report on the work of the Canadian International Polar Year party at Chesterfield Inlet (63°20′N. 90°42′W.) and a subsidiary station on the coast of Hudson Bay, 32.14 km distant. Single station visual observations, single station photographs of the brighter displays and double station photographs for height measurements were made. Equipment and procedures are described. The 200 parallactic photographs that were measured were selected mainly on the basis that their star backgrounds were easily recognizable constellations. The data are presented in several tables and diagrammatic sketches of the auroral contours shown. *Subject Headings:* **1. Auroral heights 2. Chesterfield Inlet, Canadian Arctic.**—*M.L.R.*

4J–135 551.594.53(411)

Dixon, F. E., **A 27.3-day period in the aurora borealis.** *Terrestrial Magnetism and Atmospheric Electricity*, 49(3):335–338, Sept. **1939.** 3 figs., 3 refs. **DLC**—Auroras were seen on 5224 nights during the period 1858–1938 at meteorological stations in Scotland, including Orkney and Shetland. The data are analyzed to show a 27–31 day periodicity. Concludes that the period found in auroral frequency is due to some solar phenomena. Graphs show variations of frequency of aurora in a 27–31 day period and mean variations of magnetic activity and frequency of aurora in that period. *Subject Headings:* **1. Auroral periodicities 2. Scotland.**—*M.L.R.*

4J–136 551.594.52(931)

Geddes, M., **The photographic determination of the height and position of aurorae in New Zealand during 1937.** *New Zealand Journal of Science and Technology*, Wellington, Sec. B, 20(6): 289–305, May **1939.** 3 figs., 7 tables, 13 refs. **DLC**—The photographic work on 15 auroras is reviewed and selected plates measured according to the method developed by STÖRMER. Duplicate pictures secured over three different base-lines in South Island yield determinations of the height of four displays, the results for the various forms being in good agreement with those secured in Norway. Single pictures have also been measured for determination of geographical position. An investigation is made of sunlit forms occurring at various stages of different displays. *Subject Headings:* **1. Aurora australis 2. Auroral heights 3. Auroral photography 4. New Zealand.**—*Author's abstract.*

4J–137 551.594.52

*Harang, Leiv, **Höhenänderungen des unteren Randes der Nordlichter beim Übergang von der unklen zu der sonnenbelichteten Atmosphäre.** [Change of height of auroras passing from dark o sunlit atmosphere.] *Beiträge zur Geophysik*, 54(2):81–93, **1939.** 8 figs., 4 tables, refs. German nd English summaries p. 81. **DLC**—Auroras show an increase of height when passing from dark o sunlit atmosphere. This increase is due to thermal expansion of the sunlit atmosphere. Paralactic photos of three auroras are discussed and the temperature increase is computed. *Subject Headings:* **1. Auroral heights 2. Sunlit auroras.**—*From author's abstract.*

4J–138 551.594.5:550.38

*Isaev, S. I., **O sutochnykh izmeneniiakh aktivnosti poliarnykh siianiĭ.** [Daily variations of he activity of auroras.] *Problemy Arktiki*, Leningrad, No. 2:27–37, **1939.** 11 figs., 2 tables, refs. **DLC**—A comprehensive treatise of the problem with a brief review of previous investigations. Daily variations of auroral frequency are compared with magnetic activity data and some methodological questions are discussed. Observations at 17 Russian polar stations were used. The maximum takes place from 21h to 01h. *Subject Headings:* **1. Diurnal auroral frequencies 2. Magnetic disturbances 3. Soviet Arctic.**—*N.A.S.*

4J–139 551.594.5:550.38

*Kurochkin, N. E., **Nabliudeniia poliarnykh siianiĭ v SSSR v 1938–1939 gg.** [Observations of aurora borealis in Russia during 1938–1939.] *Vsesoiuznoe Astronomogeodezicheskoe Obshchestvo, Biuleten*, No. 4:32–36, **1939.** table, 3 refs. English summary p. 36. **DLC**—Observations of aurora borealis summarized in a table which shows the place and time of occurrence. Several auroras are described and their relation to sunspots is established. Magnetic storms and radio disturbances followed the appearance of the auroras. Some auroras were seen in low latitudes, even in Crimea at 45°N. *Subject Headings:* **1. Auroral data 2. Sunspot effects 3. Magnetic storms 4. Low latitude auroras 5. Crimea, U.S.S.R. 6. U.S.S.R.**—*N.A.S.*

4J–140 551.594.5(71)

Snoddy, L. B. and Snoddy, V. C., **The determination of auroral activity by a photometric method.** *American Geophysical Union, Transactions*, 20(3):368–371, Aug. **1939.** 5 figs., 3 refs. **DLC**—Gives a description and schematic diagram of a photometer used at Churchill (94°12′W., 58°47′N.) in the summer of 1938 to determine sky brightness in the auroral zone. Figures show: 1) sky intensity for night with minimum auroral activity, 2) formation and decay of faint diffuse surfaces and 3) intensity variations during two active displays. Suggests other types of investigation in which the photometer could be used. *Subject Headings:* **1. Auroral intensity measurement 2. Photometers 3. Saskatoon, Canada.**—*M.L.R.*

4J–141 551.594.52(481)

*Störmer, Carl, **Blue auroral rays situated in the sunlit part of atmosphere.** *Terrestrial Magnetism and Atmospheric Electricity*, 44(1):7–14, March **1939.** 5 figs., 5 tables, refs. **DLC**—Blue sunlit auroral rays have been observed before sunrise in southern Norway twice since 1911—on March 23, 1920 (see *Geofs. Pub.* 4(7)) and Sept. 15, 1938. The phenomenon of the night of Sept. 15 is described and data, photographs and sketches included. Measurements of 3 sets of photographs determined height range between 244 and 650 km. The earth's shadow extended 103–138 km. Data for yellow rays as reproduced from spectral photographs are presented and discussed. *Subject Headings:* **1. Sunlit auroras 2. Blue auroral rays 3. Auroral heights 4. Auroral spectra 5. Southern Norway.**—*M.L.R.*

4J–142 551.594.52(99)

White, F. W. G. and Geddes, M., **The Antarctic zone of maximum auroral frequency.** *Terrestrial Magnetism and Atmospheric Electricity*, 44(4):367–377, Dec. **1939.** fig., 3 tables, 16 refs. **DLC**—Capt. Cook in 1773 made first scientific observation of aurora australis. Other early explorers have left records and considerable data have been collected by recent expeditions. Aurora australis seen less frequently in Graham Land and Weddell Sea than in the Ross Sea. A table gives the sources of auroral data available for Antarctica. No photographic records from the two extremities of a base line exists. The form of the auroral data available do not permit an accurate estimation of the zone of maximum auroral frequency, so the authors have made an approximation. According to this, the zone is probably circular, with center at 75°S. and 129°E., a point near the magnetic axis pole, and has a radius of about 18°. A map shows the location of the zone. *Subject Headings:* **1. Aurora australis 2. Auroral zones 3. Antarctica.**—*M.L.R.*

1940

4J–143 551.594.42(41)

Carter H. E., **Auroral notes, November 1939 to January 1940.** *Meteorological Magazine*, London 75:52–54, April **1940. Auroral notes February to April, 1940.** *Ibid.*, p. 94–96, June **1940. DLC**—There was little auroral activity in Nov. and Dec. 1939. Auroras were observed on 18 nights in Jan. 1940. Dates of observation, places of observation (Scotland, England, Ireland and nearby islands), auroral forms, color, and length of observation are noted. Similar information given in second paper. *Subject Headings:* **1. Auroral distribution 2. British Isles.**—*M.L.R.*

4J–144 551.38(02) 551.594.5:01

†Chapman, Sydney and Bartels, Julius, **Geomagnetism.** Oxford, Clarendon Press, 1940. 2 v. numerous figs. and tables, bibliog. (v. 2, p. 938–1007), eqs. **DLC.** Review by E. H. Vestine in: *Terrestrial Magnetism and Atmospheric Electricity*, 45(4):463–470, Dec. **1940. DLC**—Several chapters in this exceedingly comprehensive 2-volume compendium on geomagnetism contain information and references to literature on various aspects of the aurora and auroral physics. However, the most intensive treatment of the aurora is given in Chap. XIV where historical material is reviewed, the forms, heights, photography, distribution, spectra and observational techniques are discussed and illustrated, and the relation to magnetic disturbances and cosmic rays discussed. Chap. XXV gives in great detail the main features of the two outstanding theories of the aurora and magnetic storms: 1) the ultraviolet light theory of HULBURT (1928) whose weaknesses are pointed out and 2) the CHAPMAN-FERRARO theory which is an extension of the BIRKELAND-STÖRMER-VEGARD corpuscular theories, which the authors recommend. Chap. IX gives the basis for theories of magnetic disturbance morphology, and Chap. XXIV the theories and facts about solar corpuscular emissions and their terrestrial manifestations and effects, including the BIRKELAND-STÖRMER auroral theory and the STÖRMER equatorial ring current theory. The excellent bibliography gives 98 references for the chapter on auroras (XIV) and 17 for the chapter on auroral theory (XXV). *Subject Headings:* **1. Geomagnetism 2. Auroras 3. Auroral theories 4. Auroral bibliographies 5. Textbooks. I. Vestine, E. H.**—*M.R.*

4J–145 551.594.5(98)

Isuev, S. I., **O sutochnoĭ periodichnosti poliarnykh siianiĭ vnutri zony maksimal'noĭ chastoty.** [Daily variation of aurorae within the zone of maximum frequency.] *Problemy Arktiki*, No. 9:41–44, **1940.** 5 figs., 7 refs. **DLC**—Author compares diurnal variation of aurora with the distribution of geomagnetic excitation and presents new data for single months for a number of stations, computing the probability of aurora with due regard to cloudiness. The results of the drifting expedition "Severnyĭ Polius" show no diurnal variations. *Subject Headings:* **1. Diurnal auroral frequencies 2. Central Arctic.**—*A.A.*

1941

4J–146 551.594.52(98)

*Currie, B. W. and Jones, C. K., **Directional and diurnal characteristics of auroras at some places in Canada.** *Terrestrial Magnetism and Atmospheric Electricity*, 46(3):269–278, Sept. **1941.** 3 figs., table, 16 refs. **DLC**—Observations of auroras made at Chesterfield (61°1′N., 69°6′W.), Cape Hope's Advance (61°3′N., 90°7′W.) and Coppermine (67°8′N., 115°2′W.) as part of Canada's contribution to the Second International Polar Year and observations for Saskatoon (52°1′N., 106°6′W.) were used in this study. Describes procedure for determining position in space of auroras from simultaneous double-station photographs. A table gives mean angular directions with geomagnetic lat. and long. Outlines a method for investigating the diurnal frequency of auroras. Figure shows nightly variation of the mean hourly aurora character-numbers for Chesterfield (47 days), Coppermine (48 days) and Cape Hope's Advance (41 days). *Subject Headings:* **1. Auroral position 2. Diurnal auroral frequencies 3. Canadian Arctic.**—*M.L.R.*

4J–147 551.594.5(931)

Geddes, M., **Catalogue of aurora australis displays.** *Royal Society of New Zealand, Transactions and Proceedings*, 69(4):381–391, March **1940.** 3 tables, 3 refs. Also: **Second catalogue of aurora australis displays.** *Ibid.*, 71(3):195–198, Dec. **1941. DSI**—From 1931 to 1938 (inclusive), 348 auroras were observed in New Zealand. These tabulated with date, time of first and last observation, time of max and min activity, main auroral types and intensity (scale used is given in another table). Auroras which were unusually brilliant occurred on April 28, 1937; April 16, 1938; Sept. 9, 1933 and Jan. 22, 1938—arranged in order of magnitude. The second catalog lists 142 auroras following the same arrangement as the previous one except that the time of minimum activity has been omitted. Since 1940 auroral data have been published monthly in the *Astronomical Bulletin* of the Carter Observatory. *Subject Headings:* **1. Aurora australis catalogs 2. Aurora australis 3. New Zealand.**—*M.L.R.*

4J–148 551.594.5

Jordan, P., **Zur Deutung der sonnenbeschienenen Nordlichter.** [An explanation of the sunlit aurora.] *Zeitschrift für Physik*, 118(7/8):441–442, **1941.** refs. **DLC**—An alternative to VEGARD's theory of the sunlit aurora is proposed. The auroral emissions from the sunlit high atmosphere are ascribed to metastable N_2 and O_2 excited by UV radiation. *Subject Heading:* **1. Sunlit auroras.**—*Science Abstracts, No. 3044, Oct. 1948.*

4J–149 551.594.52(431/5)

Kassner, Carl J. A., **Nordlichtbeobachtungen in Altberlin.** [Aurora observations in old Berlin.] *Meteorologische Zeitschrift*, 58(7):243–252, July **1941.** 4 tables. Discussion by O. Meissner. *Ibid.*, 59(1):33, Jan. **1942. DWB**—List of auroras observed in Berlin, with interruptions from 1707 to 1770, compiled from astronomical diaries of the Kirsch family. The number of auroras during 36 complete years of observation was 201; maximum frequency in March and Oct. MEISSNER in his discussion gives a short statistical analysis. *Subject Headings:* **1. Auroral catalogs 2. Berlin, Germany. I. Meissner, O.**—*A.A.*

4J–150 551.594.5(481) 551.557

Penndorf, R., **Die Wintertemperaturen der Nordlichter über Tromsö.** [The winter temperatures of auroras over Tromsø.] *Meteorologische Zeitschrift*, 58(12):429–433, Dec. **1941.** fig., table, 14 refs., 4 eqs. **DWB**—Summarizing the limited available observations on the temperatures of the auroras from Oct. to April 1923–1939 made at Tromsø, the author could not find a significant variation from month to month. The mean temperature of about −45°C corresponds to the true gas temperature. The change in lower height limits of auroras from the dark atmosphere to an atmosphere illuminated from the sun is due to different conditions of excitation, rather than to thermal expansion of the air. A mean west wind of 100 m/sec^{-1} at 60°N. is derived. *Subject Headings:* **1. Auroral temperatures 2. Ionospheric winds 3. Tromsø, Norway.**—*A.A.*

1942

4J–151 551.594.5:551.510

Fuchs, J., **Zur Deutung der sonnenbeschienenen Nordlichter.** [An explanation of the sunlit aurora.] *Zeitschrift für Physik*, 119:136, **1942. DLC**—Sunlit portion of upper atmosphere has a different physical structure than the portion in the earth's shadow due to UV dissociation of molecules. Author in 1936 gave some explanation in discussion of formation of F_2 layer, temperature rise in sunlight and consequent expansion. F-layer is due to the shadow effect. (*See also* 4J–148.) *Subject Headings:* **1. Sunlit aurora 2. Ionospheric structure 3. F2-layer formation.**—*M.R.*

4J–152 551.594.5(744)

Stetson, Harlan T. and Brooks, Charles F., **Auroras observed at the Blue Hill Observatory, 1885–1940.** *Terrestrial Magnetism and Atmospheric Electricity*, 47(1):21–29, March **1942.** 3 figs., table, 6 refs. **DLC**—Table lists 280 auroras observed from June 1885 through Dec. 31, 1940 with year, month, day, time of beginning and ending (when known) and intensity (0 = faint aurora; 1 = aurora of medium brightness, 2 = brilliant aurora). Figures show hourly and seasonal distribution and secular changes in numbers of sunspots, auroras and magnetic activity. *Subject Headings:* **1. Auroral catalogs 2. Blue Hill, Mass.**—*M.L.R.*

4J–153 551.594.52(481)

*Störmer, Carl, **Remarkable aurora-forms from southern Norway. I. Feeble homogeneous arcs of great altitude. II. Some arcs and bands with ray structure. III. Isolated pulsating arcs. IV. Pulsating surfaces V. Flaming and flashing aurorae. VI. Certain cloudlike aurorae. VII. Some remarkable sunlit aurora rays. VIII. Divided aurora rays with one part in sunshine and one part in shadow. IX. Red patches and red arcs.** *Geofysiske Publikasjoner*, Oslo, 11(5), **1935;** 11(12), **1936;** 13(7), **1942.** 108+p. 81 figs., 64 plates, 33 tables, refs. **DLC**—No. I discusses in detail 3 cases: (Sept. 29, 1930; March 10, 1932; Dec. 9, 1933) of homogeneous auroral arcs occurring at about twice the normal height which were photographed simultaneously from 2 or 3 stations. Mean height of the lower borders was 195, 192 and 197 km and that of the upper borders was 232, 227 and 216 km. No. II is a study of two auroras. That of Jan. 24–25, 1936 was photographed simultaneously at 2, 3, and 4 stations, that of March 24–25, 1936 at Trondheim only. Assuming the height of the arc in the latter case, the length of rays and distances between them is calculated. No. III deals with the rare pulsating arcs observed on Dec. 19, 1919; Feb. 28, 1929 (first for which reliable height measurements were made); Oct. 31, 1931 and Sept. 21–22, 1941 (also observed in Holland and Germany). The mean heights of the last 3 were 115, 111 and 105 km. Spectra were taken of the pulsating arc of Sept. 21–22 which showed that the aurora line 5577Å dominated the whole spectrum. For No. IV several cases were chosen from 26 dates on which this form was

observed from 1925 to 1939. Of particular interest were patches along arcs in the north whic seemed to be rather low—80–85 km. No. V contains descriptions of two flashing aurora—a forn rarely seen. Measurement of a flashing arc showed that it lay between 200 and 300 km above th earth. No. VI considers 3 examples of the fairly common cloudlike type. One was measured at height of from 70 to 80 km, another (with great exactitude) at 88 km, and the third had a mea height of 106 km and formed a thin layer below simultaneously occurring red sunlit rays stretchin from 200 to more than 600 km in height. No. VII lists sunlit aurora rays observed from 1917–194(Those of Sept. 8, 1926 and Oct. 16–17, 1937 are particularly noteworthy because of their heigh up to 1100 km. No. VIII is a study of the more interesting of the 8 cases of the remarkable divide rays observed between 1920 and 1940. Some spectra taken on March 21–22, 1930 confirm earlie observations of the enhancement of the red oxygen (6300 and 6363Å) lines in sunlit rays. No. IX is a study of several red auroral arcs and patches which occur in middle latitudes, during years o sunspot maxima. The first reliable height measurement of this form was made on Jan. 25–26, 193 and showed that the spots observed lay in the height interval from about 300 to about 400 km in th earth's shadow. The three monographs are copiously illustrated with tables, line drawings, photo graphic reproductions, etc. *Subject Headings:* **1. Auroral forms 2. Auroral heights 3. Low altitud auroras 4. Sunlit auroras 5. Norway.**—*M.L.R.*

4J–154 551.594.5(492

†*Visser, S. W., **Noorderlicht.** [Aurora.] *Hemel en Dampkring*, 39(7/8,11,12):267–283, 395–400 426–435, July/Aug., Nov., Dec., **1941**; 40(2,5,7/8,9):45–53, 129–137, 194–204, 225–234, Feb., May July/Aug., Sept. **1942.** numerous figs. and refs. **DWB**—In the 6 chapters of this comprehensive series of articles the numerous aspects of the aurora are covered systematically and with ampl citations of the important literature from 170 B.C. to date. Chap. I, takes up the location, in tensity, color, forms, methods of observation and noise; Chap. II, distribution and height, periodicity (daily, 27-day, annual, 11 year and 56 year); Chap. III, magnetic, electric, ionospheric and radi propagation aspects and spectra; Chap. IV, origin, sunspots, electron streams, UV light, composition of high atmosphere; Chap. V, old Dutch observations, recent observations, catalog 1728–1940 fo Holland and, finally, Chap. VI, luminous night clouds, light of night sky, and sunlit or daylight aurora. *Subject Headings:* **1. Auroras 2. Auroral catalogs 3. Survey articles 4. Netherlands.**— *M.R.*

1943

4J–155 551.594.52(71

Angus, W. K., **The aurora borealis as seen from Edmonton.** *Royal Astronomical Society o Canada, Journal*, 37(8):316–318, Oct. **1943. DLC**—A summary of observations made betwee June 13, 1941 to May 18, 1942 and from Sept. 1 to Oct. 31, 1942. During these periods, 235 night were clear or partly clear and auroral displays were seen on 82 nights. These are classified accordin to intensity (scale I to IV), form (using abbrev. of 12 standard forms) and color. More than 96% of the displays were fairly evenly divided between the first 3 intensities. The diffuse surface form was observed in about one half of the displays and the yellowish green color was most common *Subject Headings:* **1. Aurora borealis 2. Auroral intensities 3. Edmonton, Canada.**—*M.L.R.*

4J–156 551.594.5(71

Vestine, E. H., **Remarkable aurora forms, Meanook Observatory, Polar Year, 1932–33.** *Ter restrial Magnetism and Atmospheric Electricity*, 48(4):233–236, Dec. **1943.** fig., table, ref. **DLC**— Describes homogeneous arcs (of type seen by STÖRMER, *see* 4J–53 above) observed on Feb. 26 March 26, April 1, April 15 and April 21, 1933. An auroral display of April 22 may have bee of the same type, but identification was not positive. Positions of the first two are shown in a figure and a table gives the timings of dimness and brightness of the arc of March 26. "The 28 day interval between the displays of Feb. 26 and March 26, and the 26-day interval between th displays of March 26 and April 21, may suggest recurrence of weakly penetrating solar particle from some active area of emission on the sun." *Subject Headings:* **1. Auroral forms 2. Homogeneou auroral arcs 3. Meanook, Canada.**—*M.L.R.*

1944

4J–157 551.594.52(481

*Harang, Leiv, **A study of the auroral arcs and draperies.** *Geofysiske Publikasjoner*, Oslo 13(14), **1944.** 15 p. 13 figs., 15 tables, 15 refs. **DLC.** Also: *Terrestrial Magnetism and Atmos pheric Electricity*, 50(4):297–206, Dec. **1945.** 9 figs., 6 tables, 12 refs. **DLC**—The results of height determinations of the lower border of 355 arcs and 293 draperies are given. The material has bee separated in groups according to weak, medium, strong and very strong auroral displays and it i shown that the height frequency curves show a displacement towards lower heights with increasin intensities. The influence of the moon's hour-angle on the heights is investigated and it is shown

hat there is a positive evidence for a tidal effect, the mean values of the heights are displaced 3–5 km owards greater heights from ebb- to floodtide. The directions of 215 auroral arcs have been meas-ired and the mean diurnal variation in the period 16h–24h MET for Tromsø is demonstrated. *Subject Headings:* **1. Auroral heights 2. Auroral forms 3. Lunar influences 4. Tromsø, Norway.**—*Author's abstract.*

4J–158 551.594.51(431/5)

Lange, Erich, **Deutsche Nordlichtbeschreibungen von 1726.** [German auroral descriptions of 1726.] *Meteorologische Zeitschrift,* 61(2):68–69, Feb. **1944.** From Augustin Flader, **Wiesenthälsches Ehrengedächtnis.** v. 3. Waldenburg, Johann Theodorius Heinsius, **1726.** p. 19. **DWB**—Eye witness accounts of two auroras (Feb. 17 and March 1, 1721) observed in and near Leipzig, Germany. Two previous auroras (Nov. 13, 1719 and Dec. 5, 1720) are mentioned. *Subject Headings:* **1. Auroral observations 2. Leipzig, Germany. I. Flader, Augustin.**—*G.T.*

4J–159 551.594.52:550.386

*†Vestine, E. H., **The geographic incidence of aurora and magnetic disturbance, Northern Hemisphere.** *Terrestrial Magnetism and Atmospheric Electricity,* 49(2):77–102, June **1944.** 10 figs., 4 tables, bibliog. p. 100–102. **DLC**—A statistical analysis of data collected from 1871–1942, thus continuing the work of Fritz (*see* 4J–19 above). Table 1 lists auroral frequencies for stations arranged according to geographic latitude for the First International Polar Year, Sept. 1, 1882 to Aug. 31, 1883, Table 2 lists auroral frequencies for the Second International Year, Sept. 1, 1932 to Aug. 31, 1933. The latter, in contrast to the former, occurred near sunspot minimum. Table 3 includes data for various years for period 1871–1942 (excluding First and Second Polar Years). Mean isochasms are included. *Subject Headings:* **1. Auroral data 2. Auroral frequencies 3. Magnetic disturbances 4. Northern Hemisphere.**—*M.L.R.*

4J–160 551.506:551.594.51(71)

*Vestine, E. H., **Preliminary summary, auroral observations, Meanook, Canada, December 1, 1932 to June 30, 1933.** *Terrestrial Magnetism and Atmospheric Electricity,* 49(1):25–36, March **1944.** fig., 2 tables, 7 refs. **DLC**—Visual observations at Meanook (geogr. lat. 54°6′N., long. 246°7′ E.; geom. lat. 61°8′N., long. 301°0′E.) were made regularly at 03h and 05h GMT (on nights of more wide spread and active auroras, observations were usually made until 07h GMT) from Dec. 1, 1932 to June 30, 1933. A table lists date, time, form, azimuth, altitude and intensity of aurora observed. Paper concludes with a general summary of the features of the various displays. *Subject Headings:* **1. Auroral data 2. Meanook, Canada.**—*M.L.R.*

4J–161 55:019.941(05)

†Zentralblatt für Geophysik, Meteorologie und Geodäsie. v. 1–11. Berlin, Julius Springer, **1937–1944.** Ed.: Karl Jung and others. **DLC**—Abstracts in German, French and English of articles on auroras written in various languages entered under original title will be found in section titled "Erdmagnetismus, Erdstrom und Polarlicht, Ionosphäre" (section title varies). Authors and titles are listed alphabetically in index. *Subject Headings:* **1. Abstracting periodicals 2. Geophysics 3. Auroras.**—*M.L.R.*

1945

4J–162 551.594.5(747)

Gartlein, C. W., **Progress-report of the National Geographic-Cornell University study of aurora.** *American Geophysical Union, Transactions,* 20(3):371–373, Aug. **1939;** 26(1):119–122, Aug. **1945.** 4 figs.; 3 figs. **DLC**—I. Parallactic height measurements are made at four stations—Cornell Aurora Observatory and Colgate, forming one base line and Feutes Observatory, Ithaca and Hobart College the other. About 500 photographs were taken between Sept. 1938 and April 24, 1939 of which 100 are suitable for height measurement although none had yet been made. Equipment in use and to be acquired is described. Visual observations were made at 4 parallactic stations as well as by volunteers. Figure shows number of auroras, with intensity, seen from Jan. 1, 1938 to April 23, 1939. II. States that 25 stations (U. S. and Canada) were then reporting. Code for reporting auroral observations for 3-hour period is reproduced. Punched cards were being used to analyze accumulated data. Improvements in equipment noted. *Subject Headings:* **1. Auroral research 2. Auroral photography networks 3. Auroral frequencies 4. Ithaca, N. Y.**—*M.L.R.*

4J–163 551.594.5

Harang, Leiv, **The luminosity curve of the aurorae.** *Geofysiske Publikasjoner,* 16(6), **1945.** 20 p. Also: **The auroral luminosity-curve.** *Terrestrial Magnetism and Atmospheric Electricity,* 51(3):381–400, Sept. **1946.** 8 figs., 8 tables, 14 refs., 11 eqs. **DLC**—The theoretical curve of luminosity produced by a bundle of cathode rays penetrating an atmosphere rectilinearly is discussed.

The auroral luminosity-curve is determined by photographic photometric methods. The luminosity curves observed are compared with the thoretical luminosity curve produced by cathode rays. The value of $H = (kT/mb)$ is determined as a function of height of the maximum of luminosity. The values of H determined from studies of auroras are in agreement with the values determined independently from ionospheric studies. From filter photographs the values of H are determined independently for the luminosity in green (G) and violet (V). Using the experimentally determined values of H, the density and pressure in the auroral region are computed for various heights. The curves of absorption and of luminosity for bundles of cathode rays in the range of velocities from 0.02 c to 0.9 c penetrating the model atmosphere rectilinearly are computed. The height of the abnormal E-reflections observed during auroral displays and the position of the absorbing layer are discussed. *Subject Heading:* **1. Auroral luminosity curve.**—*M.L.R.*

4J–164 551.594.5

Harang, Leiv, **Note on methods of determining the direction of auroral arcs from a single station.** *Terrestrial Magnetism and Atmospheric Electricity*, 50(4):311–313, Dec. **1945.** fig., table, 4 refs. **DLC**—Describes several methods, particularly the one in use at Tromsø. Urges the establishment of single stations wherever possible, thus making possible the collection of many accurate data in areas where parallactic photographs could not be secured. *Subject Headings:* **1. Aurora orientation 2. Single station observation.**—*M.L.R.*

***4J–165** 551.594.52:550.38

Vestine, E. H. and Snyder, E. J., **The geographic incidence of aurora and magnetic disturbances Southern Hemisphere.** *Terrestrial Magnetism and Atmospheric Electricity*, 50(2):105–124, June **1945.** 8 figs., 6 tables, refs. **DLC**—In the present paper average features of geomagnetic disturbance and aurora in south polar regions are compared with those derived on the basis of more extensive data for high northern latitudes. The seasonal and yearly average of the disturbance daily variations (S_D) is obtained for various stations in Antarctic regions and its variation in amplitude with latitude compared with that for the Northern Hemisphere. These data are used to estimate the position of the southern zone of maximum auroral frequency and this result compared with available yearly frequencies of aurora. A particular aim of the investigation is the clear indication of present deficiencies in observational data both magnetic and auroral, and of the regions most in need of additional observations. *Subject Headings:* **1. Aurora australis 2. Auroral frequencies 3. Magnetic disturbances 4. Southern Hemisphere.**—*Authors' abstract.*

1946

4J–166 551.594.5

*Prik, Zinaida Mikhaĭlovna, **Klimaticheskiĭ ocherk Karskogo moria.** [Climatic outline of the Kara Sea.] *Leningrad. Arkticheskiĭ Nauchno-Issledovatel'skiĭ Institut, Trudy*, 187:1–144, 1946. 8 figs., 123 tables, 58 charts, 30 refs., append. **DLC**—On p. 69 will be found some statistical data on frequency of aurora borealis obtained in several places around the Kara Sea. The annual variations are discussed. *Subject Headings:* **1. Auroral frequencies 2. Kara Sea, U.S.S.R.**—*N.A.S.*

4J–167 551.594.52

*Störmer, Carl, **Frequency of 12,330 measured heights of aurora from southern Norway in the years 1911–1944.** *Terrestrial Magnetism and Atmospheric Electricity*, 51(4):501–504, Dec. **1946.** fig., 2 tables, 4 refs. **DLC**—Table I shows number of nights on which aurora photographs were taken, number of single photographs taken, numbers of sets of photographs taken simultaneously from 2, 3, or 4 stations, total number of photographs and number of auroral stations in action. Table II gives auroral-height frequencies for various height intervals. Figure shows height distribution of all observations, with the maximum between 100–110 km. *Subject Headings:* **1. Auroral height frequencies 2. Southern Norway.**—*M.L.R.*

1947

4J–168 551.594.5(269)

Lamb, Hubert Horace, **Aurora australis.** *Weather*, 2(8):245–246, Aug. **1947.** **DWB**—Reports the observation of the southern lights from on board the "S. S. Balnaena" in 44°S., 24°E. on the evening of April 17, 1947 at approximately the same time that the northern lights were observed in southern England. *Subject Headings:* **1. Aurora australis 2. Antarctica.**—*M.L.R.*

4J–169 551.594.7:551.594.5(42)

Lovell, A. C. B., Clegg, J. A. and Ellyett, G. E., **Radio echoes from the aurora borealis.** *Nature*, London, 160(4063):372, Sept. 13, **1947.** 6 refs. Herlofson, N., **Interpretation of radio echoes from**

olar auroras. *Ibid.*, 160(4077):867–868, Dec. 20, **1947. DLC**—Echoes obtained during the night f Aug. 15–16, 1947 apparently originated in a luminescent cloud which appeared near the end of an urora streamer. (*Same item as* 2H–78, Aug. 1951, *MAB.*) HERLOFSON's article is a discussion f above cited paper. (*Same item as* 1–175, Jan. 1950, *MAB.*) *Subject Headings:* **1. Radio echoes rom auroras 2. Luminescent clouds 3. Auroras 4. Sferics 5. England.**—*M.R.*

4J–170 551.594.5(06)

Seaton, Stuart Luman and Malich, C. W., **Auroral research at College, Alaska, 1941–1944.** In: *Carnegie Institute of Washington, Dept. of Terrestrial Magnetism, Researches*, Vol. 12, Part II; *Carnegie Institution of Washington, Publication*, No. 175, v. 12:373–397, **1947.** 2 figs., 2 tables.) **DLC**—Description of buildings, personnel, instruments and methods, difficulties, calibration ccuracy, discussion of data. All complete nighttime radio fade-outs occurring after midnight were ccompanied by high intensity zenith aurora. Cameras and accessories illustrated. Tables give enith auroral intensities in equivalent photometer values, and corresponding values of upper- requency limits of blanketing type sporadic E reflections, Oct. 1943–March 1944, for 15 min ntervals. (*Same item as* 7–134, July 1950, *MAB.*) *Subject Headings:* **1. Observatories 2. Auroral intensities 3. Alaska.**—*M.R.*

4J–171 551.594.5(57)

Zykov, I. V., **Poliarnoe siianie v iuzhnoĭ chasti Sibiri.** [Aurora borealis in the southern part of Siberia.] *Priroda*, Moscow, 36(3):49–50, **1947. DLC**—The phenomenon was observed on Sept. 28–29, 1946, in the Kemerovo district (Kuzbass) at 55°30′N., 87°40′E. Its great intensity is explained by weather conditions and the unusual transparency of the atmosphere. Detailed description of forms and colors is given. In conclusion, the author points out the rapid change of weather to anticyclonic type which set in after this night. Some observations on the relation between the aurora borealis and weather conditions in northern areas (Pechora River region) are mentioned. *Subject Headings:* **1. Aurora of Sept. 28–29, 1946 2. Weather influences 3. Kemerovo District, Siberia.**—*N.A.S.*

1948

4J–172 551.594.5:550.385(41)

Dixon, F. E., **The aurora of January 25 to 26, 1938, and associated magnetic storm.** *Great Britain. Meteorological Office, Geophysical Memoirs*, No. 81, **1948.** 16 p. 7 figs. M.O. 499a. **DWB**—Descriptions by observers in Britain, estimates of height, reproductions of magnetograms showing magnetic storm, and calculations of overhead electric currents. (*Same item as* 7–131, July 1950, *MAB.*) *Subject Headings:* **1. Aurora of Jan. 25–26, 1938 2. Magnetic storms 3. British Isles.**—*M.R.*

4J–173 551.594.5 551.593.5

Elvey, Christian Thomas and Stone, A. M., **Report on luminescence of the night sky and aurorae.** *U. S. Office of Naval Research, London, Technical Report*, OANAR-43–47, Jan. 16, **1948.** 7+2+17 p. eqs. **DWB**—The conference was held under the auspices of the Gassiot Committee of the Royal Society. Papers presented came under two headings: 1) light of the night sky (with subheadings (a) emissions and their identification, (b) intensity variations and (c) basic processes in the upper atmosphere) and 2) auroras (with subheadings (a) emissions and their identifications, (b) intensity measurements and (c) theory of auroras). Two miscellaneous papers were presented. Append. A gives the program (speakers and their topics) and Append. B contains summaries of 12 papers. (*See also* 4J–175 below.) *Subject Headings:* **1. International Auroral Conference, London, 1947 2. Light of the night sky 3. Auroras 4. Conferences.**—*M.L.R.*

4J–174 551.594.5:77

Götz, Friedrich W. P., **Eine Anregung zur Nordlichtphotographie.** [Notes on auroral photography.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 1(1):141, **1948.** German and English summaries p. 141. **MH-BH**—Proposes a method of synchronizing photographs at distant stations. (*Same item as* 5–119, May 1950, *MAB.*) *Subject Heading:* **1. Auroral photography.** —*M.R.*

4J–175 551.521.4:551.594.51:535.33

†International Conference on the Emission Spectra of the Night Sky and Aurorae, London, 1947. Papers read at the International Conference held under the auspices of the Gassiot Committee of the Royal Society in London in July 1947. London, Physical Society, **1948.** 139 p. tables, graphs, bibliogs. (in French and English). Price: 20 s. **DWB**—A compendium of 25 papers by outstanding theoretical and experimental workers (CHAPMAN, BARBIER, NICOLET, DUFAY, A. & E. VASSY, HULBURT, VEGARD, J. KAPLAN, H. ALFVÉN, D. R. BATES and others) in the field of auroral physics

and light of the night sky from every country. *Subject Headings:* **1. Night sky spectroscopy 2. Au roral physics research 3. Emission spectra 4. Light of the night sky 5. Compendiums 6. Inte national Auroral Conference, London, 1947. I. Physical Society of London II. Royal Society London, Gassiot Committee.**—*M.R.*

4J–176 551.594.52(48

Störmer, Carl, **Auroral activity in southern Norway from the middle of August to the middle October, 1947.** *Nature*, London, 161(4084):208, Feb. 7, **1948.** ref. **DWB**—More auroras observe than ever before in such a short period. On 4 occasions auroras formed a corona and on severa red rays and red surfaces were seen. All aurora stations were in action and many pictures secured which 1920 could be used, and of these 398 could be used to determine height. Photographs take on Aug. 15–16 were especially noteworthy. One hundred and twenty five pictures were take giving 28 sets of simultaneous pictures. Of these, 8 sets were measured and gave heights of sunli auroral rays equal to the same order as the heights found by radar (that same night LOVELL, CLEG and ELLYET obtained radar echoes from the aurora for the first time, *see item* 4J–169 above). *Subje Headings:* **1. Auroras 2. Auroral heights 3. Norway.**—*M.L.R.*

1949

4J–177 551.594.5:01

†Harradon, H. C., **Bibliographic notes and selected references.** *Physics of the Earth*, N. Y. 8:741–744, [1949.] refs. **DLC**—Contains 113 citations arranged alphabetically by author. Th papers are of a general nature and summarize the development of research or review of importan auroral investigations or theories. Imprints cover the period from 1868–1937, however the bul of items was published since 1900. A number of these references has been abstracted in the presen bibliography. *Subject Heading:* **1. Auroral bibliographies.**—*M.L.R.*

4J–178 551.594.5:551.50

Penn, W. D. and Currie, Balfour Watson, **A recording meter for auroral radiations.** *Canadia Journal of Research, Sec. A*, 27(3):45–52, May **1949.** 5 figs., 6 refs. **DLC**—Describes a devic developed to give a continuous record of the intensity of auroral radiations from the zenithal sky Detection is by means of the multiplier phototube, RCA type 1P21. A null method is used, th light flux reaching the phototube being kept to a constant value by moving a neutral, wedge filte in front of the phototube. A simple servomechanism is used for this purpose. A pen attached t the filter traces a record of the changes of auroral intensity on a clock-driven chart. A circui diagram of the recorder and photographic reproductions of the auroral record for 3 periods ar included. *Subject Headings:* **1. Auroral intensity measurement 2. Recording photometers.**— *Authors' abstract.*

4J–179 551.506.1:551.594.5(988

*Sandner, Werner, **Nordlichtbeobachtungen in Grönland 1911/1931.** [Observations of auror borealis in Greenland 1911/1931.] *Polarforschung*, 2(1/2):287–292, Aug. **1949.** 5 tables, 3 refs **MH-BH**—The author has worked up the data on auroral observations contained in the Danis Yearbooks for Greenland, for the period 1911–1931 covering two sunspot cycles. The stations use were Upernivik and Jacobshavn on the west coast and Sandodden, Scroresbysound, Angmagssali and Germaniahavn on the east coast. Auroras were observed on over twice as many days on the eas as on the west coast (76:31). The earliest observed were in Sept. and the latest in March (except a Angmagssalik when it was from Aug. 15 to April 22), so the annual curve is of no significance for th months from April through Sept. Nevertheless, all except the most southerly station show mid winter maximum; Angmagssalik shows maximum in Oct. and March. The longest unbroken perio was 22 days in fall of 1927. No relation to the sunspot cycle could be found, though where a greate percentage were active aurora, a better periodicity was noted. *Subject Headings:* **1. Auroral dat 2. Sunspot effects 3. Greenland.**—*M.R.*

4J–180 551.594.

Schmid, Rudolf, **Das Nordlicht und seine physikalische Erklärung.** [The aurora borealis an its physical explanation.] *Natur und Technik*, Vienna, 3(2):40–42, **1949.** 2 figs. **DLC**—Semi popular review of present and past investigations and status of knowledge of the aurora and relate phenomena. (*Same item as* 10–185, Oct. 1950, *MAB.*) *Subject Heading:* **1. Auroras.**

4J–181 551.594.52(481

Störmer, Carl, **Étendue verticale des rayons d'aurore boréale dans les parties de l'atmosphèr à l'ombre et au soleil.** [Vertical extent of auroral streamers in the sunlit and shadow regions of th atmosphere.] *Académie des Sciences, Paris, Comptes Rendus*, 228(25):1904–1906, June 20, **1949**

figs. **DLC**—Analyses of more than 35,000 photograms of auroral streamers from the Norwegian etwork stations show a systematic difference in the heights of rays illuminated by sunlight when ompared with those formed wholly within the earth's shadow. Sunlit streamers, on the average, are ound at heights~twice as great as those in the earth's shadow; and their bases fall at a level inter- nediate to the mean height for each type. Whereas streamers observed in shadow rarely exceed eights~600 km, sunlit rays have been observed to heights >1000 km. *Subject Headings:* **1. Auroral eights 2. Sunlit auroras 3. Norway.**—*Physics Abstracts, No. 7488, Dec. 1949.*

4J–182 551.594.52(481)

*Störmer, Carl, **Quelques résultats des observations et des mesures photographiques d'aurores oréales dans la Norvège meridionale depuis 1911.** [Some results of the observations and photo- graphic measurements of aurora borealis in S. Norway since 1911.] *Göteborg, Sweden. Chalmers Tekniska Högskola, Handlingar*, No. 90, **1949.** 34 p. 21 figs., 5 tables, 29 refs. *Göteborg, Sweden. Chalmers Tekniska Högskola, Research Laboratory of Electronics, Report*, No. 16. **MH-BH**—Sys- ematic analysis of the data from 35,000 pictures of the aurora which the author has made since 923, and earlier data going back to 1911. Height frequency diagrams for the various types of uroras, orientation, variations of heights as function of hour, upper limits of rays, sunlit auroras, letails of some of the most remarkable displays, including a map of Scandinavia showing geographical listribution of the phenomenon are presented. (*Same item as* 8–143, Aug. 1950, *MAB.*) *Subject Headings:* **1. Auroral height frequencies 2. Auroral distribution 3. Norway.**—*M.R.*

4J–183 551.594.5:551.501.3

Thomsen, I. L., **A proposed auroral index figure.** *Royal Society of New Zealand, Transactions*, 77(5):58–60, Nov. **1949. DLC**—Defines a scale 1–15 based on intensity and form of aurora at hort intervals at individual stations. The scale can be integrated over separate hours and over the vhole display. (*Same item as* 2.7–195, July 1951, *MAB.*) *Subject Headings:* **1. Auroral index igure 2. Constants.**—*C.E.P.B.*

4J–184 551.594(02)(47)

Tverskoĭ, Pavel Nikolaevich, **Atmosfernoe elektrichestvo.** [Atmospheric electricity.] Lenin- grad, Gidromet. Izdat., **1949.** 250 p. 142 figs., 47 tables, 31 refs., 11 eqs. **DLC**—A textbook presenting a systematic treatment of all aspects of atmospheric electricity. Special attention is given to thunderstorm electricity. All phenomena are explained by means of physical description and only a minimum amount of mathematical theory is presented. Methods of observation are described. The results of Russian investigations are included here for the first time. The book is intended for scientists in the geophysical field, for candidates for advanced degrees, for senior year students, and for those engineers whose work involves consideration of the electrical phenomena in the atmosphere. The text is divided into five chapters: 1. The electrical state of the atmosphere; 2. Ionosphere; 3. Electrical field of the atmosphere; 4. Thunderstorm electricity and 5. Aurora borealis. (*Same item as* 4.4–13, April 1953, *MAB.*) *Subject Headings:* **1. Atmospheric electricity 2. Ionosphere 3. Thunderstorm electricity 4. Auroras 5. Textbooks 6. U.S.S.R.**—*I.L.D.*

1950

4J–185 551.594.5(931)

Atkinson, H. R., **Catalog of aurora australis displays over Canterbury, New Zealand, 1946–47.** *International Union of Geodesy and Geophysics. Association of Terrestrial Magnetism and Electricity, IATME Bulletin*, No. 13:277–284, **1950.** 7 refs. **DWB**—A catalog of about 200 observations made by 22 voluntary observers located between 43 and 44°S. and 171.5 to 173°E., in cooperation with the director of Carter Observatory, Wellington, N. Z. In all, 70 auroras were observed during 1946 (17) and 1947 (53). Unusual occurrences are described. The elaborate observation program began in Canterbury in Feb. 1946. The most remarkable display occurred on March 25, 1946. It was visible over all of New Zealand at one time or another—as far north as 39°S. CARL STÖRMER reported that March 23–28, 1946 was a period of unusual auroral activity, indicating that this was a world-wide occurrence. *Subject Headings:* **1. Auroral observation programs 2. Low latitude auroras 3. Aurora australis 4. Aurora of March 25–28, 1946 5. Canterbury, N. Z.**—*M.R.*

4J–186 551.594.52(71)

*Davies, Frank T., **Visual auroral observations in Canada, 1943–47.** *International Union of Geodesy and Geophysics. Association of Terrestrial Magnetism and Electricity, IATME Bulletin*, No. 13:255–273, **1950.** 11 tables, 7 refs. **DWB**—Observations were taken at several stations in Canada during **1943–47** either on an hourly basis or at certain time of the night. Data are sum- marized with respect to sunspot cycle, seasonal and diurnal variations, type of aurora, position in sky and percentage as well as number of auroras seen. The seasonal maximum was definitely in

winter at northern stations (Churchill, Clyde) and at various seasons (autumn or spring) at Ottawa, St. Johns, Prince Rupert, etc. At Chesterfield, during the winter of 1932, 33 auroras were observed on 92% of nights and 56% of hours. At Churchill, which is in the zone of auroral maximum, it was found that the total number of auroras decreased from sunspot minimum to sunspot maximum, but the total to the south of the zenith increased toward sunspot maximum, thus confirming reports from more southerly stations of maximum at time of sunspot maximum. Furthermore, the frequency of auroras to the north was greater in winter and to the south at other seasons, confirming reports from Ottawa of a winter minimum (auroral belt too far north to be observed at Ottawa). Diurnal maximum was before midnight in the fall and at or after midnight in winter or spring. Effect of time of observation at stations not observing every hour is marked, also effect of daylight, cloudiness, etc. greater when only one observation is made per night than when hourly observations are made. *Subject Headings:* **1. Auroral frequencies 2. Canada.**—*M.R.*

4J–187 551.594.51:621.39

Forsyth, P. A., Petrie, W., Vawter, F. and Currie, B. W., **Radar reflexions from auroras.** *Nature*, London, 165(4197):561–562, April 8, **1950.** 7 refs., 2 eqs. **DLC**—Report of investigation at Saskatoon, Canada. Radar equipment operating at a frequency of 3000 Mc/sec detected no radio echoes from auroras but well-defined and persistent echoes appeared on the 106.5 Mc/sec equipment. It could not be determined if the reflection came from the lower, brighter regions of the display or from higher points. Offers an explanation for absence of echoes on the 3000 Mc/sec frequency. *Subject Headings:* **1. Radar echoes from auroras 2. Canada.**—*M.L.R.*

4J–188 551.594.52(7

Gartlein, C. W., **Report of work on aurora since 1939 (U.S.A.).** *International Union of Geodesy and Geophysics. Association of Terrestrial Magnetism and Electricity, IATME Bulletin*, No. 13:290–292, **1950. DWB**—Several lines of auroral research carried on from 1938–48 at Cornell Univ. Ithaca, N. Y. with the aid of 50 voluntary observers in the Northern States and Southern Canada, are reported. Correlation of auroral magnitude and magnetic K figures gives coefficient of +.82. Punched cards are being used to make further analysis of the data. The southern extent of an aurora is found to be a good measure of its size. A pair of cameras was installed at Ithaca and at Hamilton, N. Y., and 2000 photographs (200 usable pairs) were obtained. Filters have been developed and motion pictures made of the principal displays since 1939. Since 1941, 2000 records of the north sky light have been made. Spectrograph work is described in some detail. *Subject Headings:* **1. Auroral research 2. Auroral photography networks 3. Auroral spectrographs 4. Aurora of March 28, 1946 5. Ithaca, N. Y.**—*M.R.*

4J–189 551.594.5(494

Götz, F. W. P., **Auroral report. (Switzerland).** *International Union of Geodesy and Geophysics. Association of Terrestrial Magnetism and Electricity, IATME Bulletin*, No. 13:288–289, **1950.** 1 refs. **DWB**—Brief report on work done in the relatively low magnetic latitude of Switzerland, on the few occasions when auroras occurred there. The first accurate height measurements ever made in Switzerland gave a mean top for the rays of 530 km. Simultaneously, CARL STÖRMER made photographs at Oslo, and determined an altitude of 800 km over Stockholm. The red oxygen (6300 Å) line and the 5199 Å line of atomic nitrogen were observed at Arosa. Attempts were made to predict auroras from the coronal emissions in the east border of the sun or from big solar eruptions. *Subject Headings:* **1. Auroral research 2. Auroral heights 3. Switzerland.**—*M.R.*

4J–190 551.594.5 550.3

†**International Union of Geodesy and Geophysics. Association of Terrestrial Magnetism and Electricity, Oslo, Aug. 1948. Transactions.** *International Union of Geodesy and Geophysics. Association of Terrestrial Magnetism and Electricity, IATME Bulletin*, No. 13, **1950.** 568 p. illus. refs. **DWB**—This voluminous collection of reports and scientific papers starts with a tribute (and photograph) to DR. JOHN A. FLEMING who was president of the IATME from 1930 to 1948, presiding over the Lisbon (1933), Edinburgh (1936) and Washington (1939) sessions and carrying on through the war years. The report consists of 57 pages of agenda and minutes of the sessions at Oslo (Aug. 19–26, 1948) and a 6 page list of brief obituaries of 46 geomagneticians who died during the period 1939–48. Part II is 7 pages of statutes of the association. Pt. III (p. 65–248) contains 24 national reports—some brief and some voluminous with extensive bibliographies of works produced in those countries. Pt. IV contains special reports of various committees—mainly those of the aurora committee under CARL STÖRMER. Pt. V contains communications of various lengths in six different branches: (A) Solar-Terrestrial Magnetism Relations; (B) Ionosphere; (C) Terrestrial Magnetism; (D) Aurora; (E) Physics of Upper Atmosphere and Ionosphere; (F) Atmospheric Electricity and Cosmic Rays. Pt. VI gives resolutions and lists the committees and Pt. VII (p. 543–568) gives addresses of members in each country and of adhering institutions and organizations. Good bibli

graphies are contributed by Belgium (26 items), France (157 items); Hungary (11 items), India 30 items); Japan (174 items); Norway (20), Sweden (43) and Switzerland (7). Extensive magnetic ata are given for East Africa, Hungary, Japan and Turkey. *Subject Headings:* **1. Auroral research . Terrestrial magnetism 3. I.U.G.G. Conference Reports. I. Joyce, J. W.** *(ed.).—M.R.*

4J–191 551.594.5

Little, D. E. and Shrum, G. M., **Correlation of auroral observations in the Northern and Southern Hemispheres.** *Royal Society of Canada, Proceedings and Transactions, Ser. 3,* v. 44, Sec. 3:51–56, une **1950.** 19 refs. **DLC**—Statistical studies of 498 auroras observed as Borealis and Australis n the same Greenwich date (between 0 hr and 12 hr G.M.T.) yield a probability of occurrence, 0.15, vith a significant degree of interdependence since, for random coincidence, the probability will be .10. Yet parallel analyses of coincident aurorae, on an intensity basis, fail to reveal a marked onnection between great displays in N and S auroral zones. *Subject Headings:* **1. Auroral frequencies . Aurora borealis 3. Aurora australis.**—*Physics Abstracts, No. 3999, May 1951.*

4J–192 551.594.5

Ol', A. I., **Novye issledovaniia poliarnykh siianiĭ.** [New investigation of auroras.] *Priroda,* Moscow, 39(9):3–14, Sept. **1950.** 4 figs., 2 tables, 30 refs. **DLC**—Review of new data on auroras nd particularly on their relationship to solar activity. The following questions are considered:) basic types, 2) geographic distribution, 3) diurnal variation, 4) relationship between auroras and nagnetic disturbances, 5) collating of auroras with solar activity, 6) determination, 7) distribution of ntensity in the spectrum and 8) theoretical substantiation of the phenomenon. *Subject Heading:* **. Auroras.**—*A.M.P.*

4J–193 551.594.52(42)

Paton, J., **Report of the Auroral Committee: Great Britain.** *International Union of Geodesy and Geophysics. Association of Terrestrial Magnetism and Electricity, IATME Bulletin,* No. 13:274–275, **950.** fig., table. **DWB**—A list of remarkable auroras (1940–47) and a graph showing number bserved each year at Cumberland, England (1920–47) shows two peak years—1938 (20) and 1947 28), and a tendency toward minima at times of sunspot minima (and vice-versa), if a tolerance of ±2 or 3 years is allowed. *Subject Headings:* **1. Auroral frequencies 2. Sunspot effects 3. Cumberand, England.**—*M.R.*

4J–194 551.594.5(09):523.74

†Schove, Derek Justin, **Visions in north-west Europe (A.D. 4000–600) and dated auroral displays.** *British Archaeological Association, Journal, 3 Ser.,* 13:34–49, **1950.** numerous refs. **DLC**—A list nd discussion of phenomena referable to aurora, in Chinese and European records from Roman era o 654 A.D., and their relation to the 11-year sunspot cycle. *Subject Headings:* **1. Auroras 2. Sunpot effects.**—*C.E.P.B.*

4J–195 551.594.5(481,988):77

†Störmer, Carl, **Report on aurora work since 1939 (Norway).** *International Union of Geodesy nd Geophysics. Association of Terrestrial Magnetism and Electricity, IATME Bulletin,* No. 13:286 88, **1950. DWB**—A list of 19 papers published by the author between 1939 and 1947 is appended o a brief outline of: 1) work done by a network of stations in S. Norway in photographing the aurora; 2) measurement of the accumulation of 35,000 pictures made since 1911 (over 12,000 have been tudied statistically); 3) measurement and publication of the photographs made by the French-Norwegian and Danish Expeditions to Northwest Greenland in 1938–39 and 4) calculation of the rbits of electrons in a magnetic dipole field. *Subject Headings:* **1. Auroral photography 2. Auroral esearch 3. Norway 4. Northeast Greenland.**—*M.R.*

4J–196 551.594.5(931)

Thomsen, I. L., **Report of New Zealand work on the aurora australis.** *International Union of Geodesy and Geophysics. Association of Terrestrial Magnetism and Electricity, IATME Bulletin,* No. 13:285–286, **1950. DWB**—A brief summary of work done since 1939 in New Zealand, problems o be studied, and importance of New Zealand in world wide studies of the aurora. New Zealand s the only inhabited land mass in the Southern Hemisphere from which long period measurements f the aurora can be made near the zone of maximum activity. Tasmania and Campbell Island re also important in the network. *Subject Headings:* **1. Aurora australis 2. Auroral observation rograms 3. New Zealand.**—*M.R.*

4J–197 551.594.52

Vestine, E. H., **Analysis of visual observations of aurora.** *International Union of Geodesy and Geophysics. Association of Terrestrial Magnetism and Electricity, Oslo 1948, Transactions,* **1950,**

p. 465. 3 refs. **DWB**—Brief report of work since 1939, stating that a tentative revision of th isochasms of FRITZ (*see* 4J–19) for the Northern Hemisphere has been made on the basis of dat accumulated since 1871. Charts of hourly frequency of aurora have also been constructed, and tentative chart of probable isochasms for the Southern Hemisphere made. *Subject Headings* **1. Auroral frequency charts 2. Southern Hemisphere. I. Fritz, Hermann.**—*M.R.*

4J–198 551.594.5

Vestine, E. H., **Report on auroral work of the Department of Terrestrial Magnetism, Carnegi Institution of Washington, since 1939.** *International Union of Geodesy and Geophysics, Associatio of Terrestrial Magnetism and Electricity, IATME Bulletin*, No. 13:293, **1950.** 3 refs. **DWB**—Th daily, hourly and geographical frequency of auroras was determined as accurately as possible b extending the data to allow for cloudiness, poor visibility, daylight, geomagnetic conditions, etc. i both hemispheres. FRITZ's charts of frequency based on data up to 1871 were tentatively revised Polar Year (1883–1932–33) data were used to calculate diurnal variation of various forms of auror and hourly isochasms drawn for 0, 6, 12 and 18h GMT for the Northern Hemisphere. A few publica tions are listed. *Subject Headings:* **1. Auroral frequency charts 2. Auroral research.**—*M.R.*

4J–199 551.510.53

Waynick, A. H., **Summary of conference.** (In: **Proceedings of the Conference on Ionospheri Research (June 1949.)** *U. S. Air Force. Cambridge Research Laboratories, Geophysical Researc Papers*, 7:167–174, Dec. **1950.**) **DWB**—Fourteen recommendations of former conferences fo for further research are compared with the results of the conference in June 1949. Summarize symposia of five important problems of ionospheric research are given. *Subject Headings:* **1 Ionospheric research 2. Conferences 3. Symposia. I. Conference on Ionospheric Research June 1949, State College, Penna.**—*A.A.*

1951

4J–200 551.594.5

Abbott, W. N., **The aurora of August 19, 1950, photographed in Greece.** *Journal of Atmospheri and Terrestrial Physics*, 1(5/6):343–344, **1951.** 2 figs., 5 refs. French version in: *L'Astronomie* Paris, 66:67, Feb. **1951. DWB**—The first photograph of an aurora registered in Greece is given (*Same item as* 3.5–286, May 1952, *MAB.*) *Subject Headings:* **1. Aurora of Aug. 19, 1950 2. Lo latitude auroras 3. Greece.**—*A.A.*

4J–201 551.510.53

*Alaska. University. Geophysical Institute, **State of the earth's atmosphere in the Arct** Contract W28-099-ac-445, Research Reports, Nos. 1–10, 12, (Final Report), Aug. 17, 1948–Nov. 15 1950, April 30, **1951.** 11 pieces. graphs, tables, refs. **DWB**—This final report summarizes al of the work done under this contract at College, Alaska, between Feb. 1, 1948 and April 30, 195 under the direction of DR. S. L. SEATON and W. S. WILSON. Studies were made of: 1) The inadequacy of the theory of formation of the E layer by UV ionization; 2) Winds in the ionosphere; 3) Atmos pheric ozone at College, Alaska; 4) Searchlight investigations of stratosphere; 5) Temperature o the upper atmosphere and, finally, 6) Theories of ionization, recombination, diffusion and othe properties of the ionosphere. Methods of measurement, development of instruments, record obtained and extensive data tabulations are included and literature reviewed. *Subject Heading* **1. Ionospheric research 2. Searchlight soundings 3. Ionospheric winds 4. Ozone 5. Ionizatio 6. College, Alaska. I. Contract W28-099-ac-445 II. Seaton, S. L. III. West, S. S. IV. Jones Mark W. V. Bauer, John R. VI. Jones, J. G. VII. Jones, Mrs. Mark W. VIII. Cashen William R. IX. Lehman, Eugene H., Jr. X. Wilson, William S. XI. Yerg, Donald G. XII George, E. F. XIII. Katzenstein, Jack.**—*M.R.*

4J–202 551.594.5(747

Berkey, Donald Keith, **Intensity distribution in auroral arcs.** Colgate University, Con tract Nonr-07800; Project No. 082074, Report No. 3, April 25, **1951.** [14 p.] 10 figs., refs Mimeo. **DWB**—First part of paper states present objective of the project, summarizes progres made up to Jan. 1, 1951 and outlines plans for future research. The appendix, "Luminosity o auroral arc," describes a method of analyzing auroral photographs and the application of the metho to the aurora of Oct. 15, 1949. Its geographical position was determined as 530 km away fro Ithaca, N. Y. A graph shows its relative luminosity as a function of height. "The shape of thi graph agrees qualitatively with that derived by HARANG on theoretical grounds and with some of th experimental results he obtained on auroras in Norway." *Subject Headings:* **1. Auroral arcs 2. Au roral intensity distribution 3. Ithaca, N. Y. I. Colgate Univ. II. Contract Nonr-07800.**—*M.L.R.*

4J–203 551.594.5:551.594.7(744)

Davidson, D., **Reflexion of high frequencies during auroral activity.** *Nature*, London, 57(4242):277–278, Feb. 17, **1951.** 2 figs., 2 refs. **DWB**—Ionosphere reflection of 17.31 Mc/sec. waves observed at Concord, Mass. on Aug. 8, 1950 during strong aurora. (*Same item as* 2.7–193, July 1951, *MAB.*) *Subject Headings:* **1. Auroral effects 2. Ionospheric reflection 3. Concord, Mass.**—*C.E.P.B.*

4J–204 551.594(931,946)

Garner, D. M., **Preliminary investigation of aurora australis activity 1931 to 1949.** *New Zealand Journal of Science and Technology, Sec. B*, 33(1):11–14, July **1951.** 3 figs., table, 7 refs. **DLC**—Records collected at Carter Observatory, Wellington, include those from New Zealand (and some from Australia) from 1913–1949, from Tasmania since 1939, from Campbell Island since 1941 and from Heard and Macquarie Islands since 1948. Discussion covers auroral frequency, annual variation of auroras and correlation between auroral activity and sunspot numbers. (*Same item as* 4D–236, April 1953, *MAB.*) *Subject Headings:* **1. Aurora australis 2. New Zealand 3. Tasmania.**—*M.L.R.*

4J–205 551.594.52(237)

Gartlein, Carl Witz and Moore, R. K., **Southern extent of aurora borealis in North America.** *Journal of Geophysical Research*, 56(1):85–96, March **1951.** 5 figs., map, 7 refs. **DWB**—Tabulation of auroral frequency for North America which has been done at Cornell University, Ithaca, N. Y., since late in 1938 shows the relative frequency of overhead auroras at different geomagnetic latitudes and different times of the year. In the region between 58° and 60° (geomagnetic latitude), which lies between Montreal and James Bay, Canada, the seasonal effect is not marked, but in lower latitudes (New York to Montreal) the maximum occurs at the time of the equinoxes. A comparison during years of sunspot maximum or minimum shows some apparent correlation but this correlation does not stand up very well under statistical tests. Some auroras have been observed south of 52° (New York City) during every month of the year. (*Same item as* 3.5–287, May 1952, *MAB.*) *Subject Headings:* **1. Auroral frequencies 2. Auroral distribution 3. Sunspot effects 4. North America.**—*M.R.*

4J–206 551.594.5(02) 550.385

*†Harang, Leiv, **The aurorae.** N. Y., John Wiley and Sons, **1951.** 166 p. 152 figs., 32 tables, bibliog. p. 159–163, eqs. *International Astrophysics Series*, v. 11. **DLC, DWB.** Review by W. Petrie in *American Journal of Physics*, 20(3):187–188, March **1952. DLC**—This is the first comprehensive text on the aurora in the English language since the translation of Fritz's work in 1883. The 8 chapters take up in order: 1) Forms, distribution, frequency, height, photography and calculation of pairs of plates; 2) Height statistics in various regions and for various types; 3) Spectra: intensity and identification of lines, their interpretation with respect to temperature and composition of upper atmosphere; 4) Sodium D-lines, twilight and night sky luminescence; 5) Magnetic storms and auroras; 6) Corpuscular theory; 7) The physics of the upper atmosphere—density, absorption and emission, luminosity, relation to geographical height, etc. and 8) The ionosphere and the aurora and relation to terrestrial magnetic perturbations. The book is profusely illustrated with photographs, recorder records, schematic diagrams, graphs, charts and other illustrative material; has a good bibliography and brief author and subject indexes. It is based on the very latest observational material and theory. (*Same item as* 4.3–7, March 1953, *MAB.*) *Subject Headings:* **1. Auroras 2. Magnetic storms 3. Textbooks. I. Petrie, W.**—*M.R.*

4J–207 551.594:550.38

†Harang, Leiv, **Aurorae and magnetic storms.** (In: **Compendium of meteorology.** Boston, American Meteorological Society, **1951.** p. 347–355. 8 figs., table, 19 refs., eq.) **MH-BH**—A short summary of relationship between auroras and magnetic storms is given. The occurrence of auroras and the behavior of the ionosphere during magnetic storms which originated from solar particles is examined. Other sections are devoted to the appearance of auroral forms, their position in space, the spectrum and the corpuscular theory of auroras. Six photographs of different auroral forms are given. The lower limit of auroras is most frequently observed between elevations of 100 and 120 km. *Subject Headings:* **1. Auroral magnetic relationships 2. Ionosphere 3. Solar activity.**—*A.A.*

4J–208 551.594.5(41)

*Housman, W. B., **Report of section; aurora and zodiacal light. (Interim report.)** *British Astronomical Association, Journal*, 61(4):100–103, March **1951.** tables. **DLC**—Report covers details of observations on 39 auroral nights between July and Dec. 1950, including position and name of observer, form of aurora, etc. Cases of luminous sky, noctilucent clouds (June 30), zodiacal light

also reported. Table shows monthly frequency of aurora in British Isles during 1948, 1949. Ha (60) of total (128) were in Oct. and Nov. (*Same as item* 2.9–175, Sept. 1951, *MAB.*) *Subje Headings:* **1. Auroral frequencies 2. Optical phenomena 3. British Isles.**—*M.R.*

4J–209 551.594.

International Union of Geodesy and Geophysics, **Photographic atlas of auroral forms an scheme for visual observations of aurorae.** Oslo, A. W. Broggers, **1951.** 23 p. plates. **DLC–** The various auroral forms are described and illustrated with photographs. Station, date, altitud and azimuth are given for each photo. Five procedures are listed for visual observation. *Subje Headings:* **1. Auroral atlases 2. Visual observation of auroras.**—*M.L.R.*

4J–210 551.594.5:01

†Laursen, Vigo (*comp.*) (*Danish Met. Inst.*), **Bibliography for the Second International Pola Year, 1932–33.** Copenhagen, I.M.O. Temporary Committee on the Liquidation of the Polar Yea 1932–33, **1951.** 253 p. **DWB**—The section on aurora (p. 242–247) consists of 77 references, liste alphabetically by author. A number of these are abstracted in this bibliography. (*Same item a* 4.1–28, Jan. 1953, *MAB.*) *Subject Headings:* **1. Bibliographies 2. Auroral bibliographies 3. Inter national Polar Year 1932–1933. I. I.M.O. Temporary Committee for the Liquidation of the Pola Year 1932–1933.**—*M.L.R.*

4J–211 551.594.5(42)(52

Schove, Derek J., **English aurorae of A.D. 1660/61.** *British Astronomical Association, Journa* 62(1):38–41, Dec. **1951.** 8 refs. Also: **London aurorae of A.D. 1661.** *Ibid.*, 63(7):266–270, July **1953.** refs. **DWB**—HALLEY, in describing the great aurora of 1716 (*see* 4J–2) stated that ther had been nothing of the kind since 1574. SCHOVE states that during that time there had bee many displays but the observations seldom got into scientific literature because they were considere as religious experiences. The author notes observations of aurora in 1660 on Oct. 17 (Hertfordshire) Oct. 3 (Hull), Nov. 5 and Dec. 8 (Essex). Similar records exist for 1661. A note lists 4 observation of aurora in Japan for 1656–1662. Second article gives two detailed accounts of auroras on Marc 14 and 21, 1660—probably a single display. *Subject Headings:* **1. Auroras 2. England 3. Japan.**— *M.L.R.*

4J–212 551.594.52:550.385(436

Trapp, E., **Das Nordlicht vom 28. Oktober 1951.** [Aurora borealis of October 28, 1951. *Wetter und Leben*, Vienna, 3(11/12):268–269, Dec. **1951. MH-BH**—A description of the auror borealis based upon voluntary reports of individuals who had observed it in various parts of Austri is presented and the frequency of reports received by provinces is listed. The magnetic disturbance observed in conjunction with the aurora borealis are described briefly. (*Same item as* 4.2–292. i Feb. 1953, *MAB.*) *Subject Headings:* **1. Aurora of Oct. 28, 1951 2. Auroral magnetic relationship 3. Austria.**—*I.L.D.*

1952

4J–213 551.594.5:621.39

Bowles, K., **The fading rate of ionospheric reflections from the aurora borealis at 50 Mc/sec** *Journal of Geophysical Research*, 57(2):191–196, June **1952.** 3 figs., 2 refs. **MH-BH**—Amateu radio operators communicate from time to time by a phenomenon of anomalous ionospheric propaga tion associated with the aurora borealis. Measurements have been made of the rapid flutter-typ of fading associated with this kind of propagation at 50 Mc/sec. The power-spectrum of the fadin seems to have frequency-components of roughly equal strength from zero frequency to a cut-of frequency between 100 and 200 cycles/sec. The fading frequency is thus about a power of te greater than might be anticipated from usual ionospheric velocities. In most cases, both transmittin and receiving antennas must be of the same polarization and must both be pointed more or less in th direction of the visible aurora. Amplitude modulated speech-transmission is occasionally possibl at 50 Mc/sec by means of this type of propagation. (*Same item as* 4.5–233, May 1953, *MAB.* *Subject Headings:* **1. Radio transmission 2. Auroras.**—*Author's abstract.*

4J–214 551.510.535:0

Conference on Ionospheric Physics, Pennsylvania State College, July 1951, **Proceedings, Pts A and B.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, Nos. 11 an 12, April **1952.** graphs, diagrs., bibliogs., eqs. **DWB**—These Proceedings were also issued earlie in Dec. 1950 by the Pennsylvania State College and GRD under the editorship of C. H. GRACE in a 1 v. edition. A few of the papers have different titles than appeared in the preliminary edition but except for editing and remarks, the 19 papers are the same in the two editions, representing th lectures given by world famous specialists on problems of the ionosphere, aurora, mesosphere

iemosphere and exosphere. (*Same item as* 4.6–3, June 1953, *MAB.*) *Subject Headings:* **1. Iono-**
)heric physics 2. Upper atmosphere 3. Conferences. I. Gerson, N. C. (*ed.*) **II. Donaldson,**
alph J., Jr. (*ed.*) **III. Katz, Ludwig** (*ed.*) **IV. Grace, Clinton H.** (*ed.*) **V. U. S. Air Force. Cam-**
ridge Research Center VI. Pennsylvania. State College.—*M.R.*

4J–215 551.594.51(04)

Gerson, N. C., **The Colloquium on auroral physics.** *Franklin Institute, Philadelphia, Journal,* 53(4):331–338, April **1952. DLC**—The Colloquium was held at London, Ontario on July 27–28, 1951 under the joint sponsorship of the Geophysics Research Div. of the Air Force Cambridge Research Center and the University of Western Ontario. The author presents a concise but informative summary of the discussion of the four sessions. The first session, with B. FRIEDMAN as chairman, was on "Electromagnetics as applied to auroral problems" and covered the following topics: "(a) the passage of a neutral stream of ionized matter from the sun towards the earth; (b) the interaction of this neutral plasma with the geomagnetic field to cause a ring current (and the early and late phases of magnetic storms); and (c) the subsequent movement of charges along the magnetic lines of force towards the terrestrial atmosphere eventuating in the observed luminosities." The theories of CHAPMAN and FERRARO on auroras and magnetic storms and MARTYN's extension of these theories were reviewed and MALFORS' experiment on the terrella was described. R. W. B. PEARSE was moderator of the second session which discussed "Interpretation of auroral and airglow spectra." The molecular spectra and atomic lines possibly present in the auroral spectra were considered as they relate to the composition of the ionosphere (80–400 km) and mesosphere (400–1000 km). Conclusions are drawn as to the positive existence of certain bands and lines and doubtful existence of others. "Quantum mechanics as applied to auroral problems" was the subject of the third session presided over by TA-YOU-WU. "This meeting considered the vitally important but very much neglected field of cross sections for collision of atomic molecular and ionized particles found in the ionosphere and mesosphere (a) to each other and (b) to the auroral bombarding particles." The fourth session was under the chairmanship of D. R. BATES, "Laboratory investigations of mesospheric processes" was the topic. In this session various experiments which have been undertaken, or are planned, to study various processes in the ionosphere and mesosphere were explained. (*Same item as* 3.11–278, Nov. 1952, *MAB.*) *Subject Headings:* **1. Auroral physics 2. Symposia.**—*M.L.R.*

4J–216 551.510.53

†Gerson, N. C., **Unsolved problems in physics of the high atmosphere.** *Advances in Geophysics,* New York, v. 1:155–242, **1952.** 12 figs., 10 tables, 177 refs. **DLC**—The various subdivisions of the atmosphere (troposphere, stratosphere, chemosphere, ionosphere, mesosphere and exosphere) are defined and discussed. Chemical composition of the atmosphere is discussed and given in tables of the normal chemical constituents, the isotopes, ionization and dissociation potentials of molecules, and probably constituents of ionosphere and chemosphere, and origin thereof. Also tabulated are temperature, pressure number density, mean free path and kinematic viscosity at altitudes from 0–800 km in mid latitudes and two seasons. The ionosphere, emissions (air flow and aurora) and spectra thereof, new techniques for estimating ionospheric winds from cloud (noctilucent, luminous, air glow and sporadic E clouds) movements. States properties and processes such as temperature and its determination by various means, composition as determined from emission spectra and absorption spectra, photochemical equilibrium, collisional phenomena, ionospheric tides and other oscillations, diffusion in magnetic and electric fields and, finally, a summary of unsolved problems which are being or should be worked on. A very extensive bibliography (177 items) on all aspects of high atmospheric physics is appended. (*Same item as* 4.8–9, Aug. 1953, *MAB.*) *Subject Headings:* **1. Upper atmosphere research 2. Atmospheric structure 3. Atmospheric composition 4. Review articles 5. Advances in geophysics.**—*M.R.*

4J–217 551.594.5

†Harang, Leiv, **Polarlicht.** [Aurora.] (In: Landolt, Hans Heinrich and Börnstein, Richard, **Zahlenwerte und Funktionen aus Physik, Chemie, Astronomie, Geophysik und Technik.** 6th ed. v. 3. **Astronomie und Geophysik.** Berlin, Springer, **1952.** p. 767–773. 10 figs., refs.) **DWB, DLC**—Contains brief discussions of auroral forms, geographic distribution of auroras, direction of arcs, position of radiation point, auroral heights and spectrum illustrated with graphs. Approximately half of the references are to auroral spectrum. *Subject Heading:* **1. Auroras.**—*M.L.R.*

4J–218 551.594.51:551.508.85

Hellgren, Gösta and Meos, Johan, **Localization of aurorae with 10 m high power radar technique, using a rotating antenna.** *Tellus,* 4(3):249–261, Aug. **1952.** 18 figs., 11 refs. **MH-BH**—The paper describes the 10 m high-power recorder with a rotating antenna that is used since May 1951 for the localization of aurorae at the Radio Wave Propagation Laboratory of the Kiruna Geophysical

Observatory (67.8°N., 20.5°E.). Continuous observations during the time of May 1951–Marc 1952 have disclosed periods of auroral activity. The preliminary results from these observation indicate that there is a good correlation between the auroral activity, the magnetic activity, and th appearance of the N_I-layer, a special type of sporadic E ionization often appearing in connectio with magnetic bays and supposed to be caused by the same ionizing agent as the aurora. Th distribution in range and bearing of the recorded aurorae agrees with the simple theory that mos of the radio wave scattering comes from those points where the radar beam is perpendicular to th surface of the auroral discharges. The calculated height distributions of the reflection centers hav maxima around 120 km. (*Same item as* 4.6–247, June 1953, *MAB.*) *Subject Headings:* **1. Aurora 2. Auroral recorders.**—*Authors' abstract.*

4J–219 551.594.

Lebedinskiĭ, A. I., **Luchistye i dugovye formy poliarnykh siianiĭ.** [Auroral streamers and arcs. *Akademiia Nauk, SSSR, Doklady*, 86(5):913–916, **1952.** figs., 9 refs., 3 eqs. **DLC**—Proposes general theory of auroras, explaining auroral rays by the excitation of molecules and auroral arcs b the excitation of ions alone. (*Same item as* 4.7–223, July 1953, *MAB.*) *Subject Headings:* **1. Aurora theories 2. Auroral streamers 3. Auroral arcs.**—*A.A.*

4J–220 551.510.535:551.557:550.38

Little, C. G. and Maxwell, A., **Scintillation of radio stars during aurorae and magnetic storms** *Journal of Atmospheric and Terrestrial Physics*, 2(6):356–360, **1952.** 3 figs., 6 refs. **DWB**—Scinti lations of radio stars on 3.7 m during auroras of Sept. 25 and Oct. 28, 1951, averaged 4 or more pe min compared with 1–2 in normal conditions. On Oct. 28 signal intensity decreased by 10% a maximum aurora. Scintillation rate also has high + correlation with geomagnetic K index. Rec ords of receivers 3 km apart show that changes of fluctuation rate are due to changes in speed c passage of quasi-stable disturbances, which may be about 120 km across. During aurora averag wind speed in upper ionosphere was about 400 m/sec; changes in scintillation rate are due to change in this velocity. (*Same item as* 4.3–104, March 1953, *MAB.*) *Subject Headings:* **1. Ionospheri variations 2. Ionospheric winds 3. Auroras 4. Magnetic storms.**—*C.E.P.B.*

4J–221 551.510.5(02

†*Mitra, Sisir Kumar, **The upper atmosphere.** 2nd ed. Calcutta, The Asiatic Society [prefac **1952**]. 713 p. figs., tables, eqs., bibliog. p. 644–668. **DLC, MH-BH**—The first edition of thi valuable work, published in 1947, contained 616 pages (*see item* 1–57, Jan. 1950, *MAB*). In thi edition about 100 pages of new material have been added, including the results of the latest researc in almost every field covered by the 13 chapters. These additions include work on escape of atmos pheric gases (Chap. I), atmospheric tides (Chap. II), radar studies of meteors (Chap. III), variation in ozone content with latitude and air masses (Chap. IV), dissociation of N_2 (Chap. V), ionospheri sounding by radio waves, estimation of recombination coefficients, tides and traveling disturbance in the ionosphere (Chap. VI), Sq and L = variations near the geomagnetic equator (Chap. VII) up-to-date bands and lines in auroral spectrum (Chap. VIII), new theories of magnetic storms an aurora by ALFVÉN and MARTYN (extension of Chapman-Ferraro theory) (Chap. IX), Russian wor on zodiacal light and afterglow or airglow, height measurements of luminescent layers, hydrogen an sodium in the upper atmosphere, etc. (Chap. X), revised model of temperature distribution in uppe atmosphere (GERSON) (Chap. XI), a new chapter on rocket exploration of upper atmosphere (V- and aerobee flights) (Chap. XII), and new unsolved problems of the upper atmosphere (Chap XIII). Brief discussion of winds at high levels from indirect methods (Chap. XIV). No attemp at listing all of the important subjects covered in this work would do justice to its comprehensiveness In most cases the sources are carefully cited and a class bibliography of nearly 1000 references is a further aid in locating source material on all fields of upper air research by physical methods. (*Sam item as* 4.8–15, Aug. 1953, *MAB.*) *Subject Headings:* **1. Upper atmosphere physics 2. Physics o the atmosphere 3. Textbooks.**—*M.R.*

4J–222 551.594.5(52):551.58

Nishioka, Hideo, **The seven hundred year period in the climate and the aurora borealis i Japan.** *Pacific Science Congress, 7th, Auckland and Christchurch, N. Z., 1949, Proceedings*, 3:118–121 **1952.** 3 figs., table. **DWB**—Measurement of tree rings shows a 700-year wave of climatic chang in Japan. Also cited evidence from the classics, archeological discoveries and from botanica and zoological sources. Author believes that there is a connection between the 700-year periodicity of climatic change and the occurrence of aurora. A table lists, with date and location, the appearance of 52 auroras between 621 and 1941. Most of them were observed in century of colder weather few or none in warmer periods. Author also points out that the monthly frequency of aurora i Japan bears a resemblance to that in other countries. *Subject Headings:* **1. Climatic changes 2. Au roral periodicities 3. Japan.**—*M.L.R.*

4J–223 551.594.5(41)

Paton, James, **The frequency of aurora over the British Isles.** *Weather*, 7(8):256, Aug. **1952. DWB**—Proposes a plan to make a survey of the frequency of aurora during one sunspot cycle period, say from 1952–1964. Lists the type of information needed and makes a plea for volunteer observers. Emphasizes the fact that in a survey of this type, it is as important to record when *no* aurora is visible in a clear sky as to note its presence. The primary purpose of the survey is to prepare a map for the area showing the frequency of aurora nights in each latitude, which records the number of nights in the year when aurora is *overhead* at each observing station. *Subject Headings:* **1. Auroral frequency surveys 2. Isoauroral diagrams 3. British Isles.**—*M.L.R.*

4J–224 551.594.52(42)

Robinson, C. A. and George, D. J., **Auroral arch of January 29, 1952.** *Meteorological Magazine*, London, 81(962):248, Aug. **1952. DWB**—Arc was quiescent for sometime but after decreasing in intensity began to pulsate and occasionally white rays could be seen extending upwards. Later another arc could be seen above the first one. Finally, they degenerated into a diffuse glow which gradually decreased in intensity until it disappeared. Observation was made at Shawbury. *Subject Headings:* **1. Auroral arcs 2. Shawbury, England.**—*M.L.R.*

4J–225 551.594.5

*Saskatchewan. University. Physics Dept., **The orientation of auroral displays in west-central Canada.** Contract AF 19(122)-152, Scientific Report No. AR-9, [1952?] 11 p. fig., 4 refs. **DWB**—Using 628 photographs taken at Saskatoon (52.1°N., 106.6°W.) during 1949–1951, the average orientations in space of auroral arc and bands was found to be 96.4°. Procedures were similar to those used by CURRIE and JONES (*see items* 4J–146 above). Detailed tabular material is included. They indicate "possible variations in the auroral orientation at Saskatoon geomagnetic longitude and latitude with season and with auroral and magnetic activity." *Subject Headings:* **1. Auroral orientation 2. Saskatoon, Canada. I. Contract AF 19(122)-152 II. Jensen, R. E.**—*M.L.R.*

4J–226 551.594.5

Stenz, Edward, **Jak obserwować zorze polarną.** [How to observe auroras.] *Gazeta Obserwatora PIHM*, Warsaw, 5(1):2–4, Jan. **1952.** diagrs. **DLC**—In view of the fact that the last appearance of aurora in Poland on Oct. 28, 1951, brought a large number of letters from many parts of the country to PIHM giving descriptions of the phenomenon and that the majority of them were amateurish and did not contain enough concrete and useful information, the author gives instructions on how to carry out and record observations of this unusual phenomenon. Following elements should be carefully checked and recorded: the accurate time of every individual phase; the variation of its forms according to international symbols; intensity and color of the light; its position in the sky according to direction of axis; amount and kind of cloudiness. The author adds that snapshots and drawings can be useful. *Subject Heading:* **1. Visual observation of auroras.**—*A.M.P.*

1953

4J–227 551.594.5:551.521.7

Bates, David R. and Griffing, G., **Scale height determinations and auroras.** *Journal of Atmospheric and Terrestrial Physics*, 3(4):212–216, May **1953.** 3 figs., table, 9 refs., 4 eqs. **DWB**—L. HARANG's method of calculating scale heights of auroras between 100 and 270 km is regarded as invalid because of incorrect assumptions (beam of electrons, sunlit auroras). Penetration of protons into a model atmosphere is considered; calculated luminosity-height curves are compared with observed curves and discrepancies discussed. *Subject Headings:* **1. Auroral intensities 2. Solar protons.**—*C.E.P.B.*

4J–228 551.594.52

Chapman, Sydney, **Polar and tropical aurorae: and the isoauroral diagram.** *Indian Academy of Sciences, Bangalore, Proceedings, Sec. A*, 37(2):175–188, Feb. **1953.** fig., 10 refs. **DLC**—Refers to work of FRITZ (one of the founders of the science of auroral morphology), and VESTINE and SNYDER in producing isochasmic diagrams. Then emphasizes the need for a new kind of auroral diagram, the isoauroral, which will give lines at all points along which there is the same frequency of (nights of) auroral occurrence along the point, instead of the same frequency of visibility from the point. The last part of the paper deals with 3 reports of observations of aurora in India (at Benares, Nov. 11, 1847; on the Soane River, Feb. 4, 1878; and various places in Feb. 1872) and appeals to Indian scientists for material relating to these and other auroras. *Subject Headings:* **1. Isochasmic diagrams 2. Isoauroral diagrams 3. Auroral observations 4. Low latitude auroras 5. India.**—*M.L.R.*

4J–229 551.501.89:551.594.5

Chapman, Sydney, **The geometry of radio echoes from aurorae.** *Journal of Atmospheric and Terrestrial Physics*, 3(1):1–29, Jan. **1953.** 8 figs., 3 tables, 9 refs., eqs. **DWB**—An examination of discrete auroral echoes in which part of a radio beam is reflected back to sending station in Northern Hemisphere from an aurora borealis, or possibly from an aurora australis stream beyond the atmosphere. The reflecting unit is taken to be an auroral ray lying along a line of force of the geomagnetic field. Diagrams and tables show positions of surfaces reflecting radio beams of different elevations at stations in different latitudes. (*Same item as* 4.9–34, Sept. 1953, *MAB.*) *Subject Headings:* **1. Auroras 2. Radio echoes from auroras.**—*C.E.P.B.*

4J–230 551.594.5

†Ferraro, V. C. A., **The aurorae.** *Advances in Physics*, 2(7):265–320, July **1953.** 22 figs., 6 plates, 4 tables, refs., 22 eqs. **DWB, DLC**—A fairly brief but comprehensive survey of the several aspects of aurora. Opens with a review of general characteristics including: classification, color, height, low aurora and auroral sounds, geographical distribution, diurnal and annual variation, sunlit aurora and variation of intensity with height; next discusses the relationship between auroral and solar activity and geomagnetism, including 27-day and 11-year periodicity. This is followed by a review of the work on auroral spectrum by VEGARD, RAYLEIGH, SLIPHER, KAPLAN, DUFAY and GAUZIT, STÖRMER, and VEGARD and KVIFTE, with a summary of the results for the main emission lines of high latitude aurora by the last two above-named. An explanation of solar and UV light hypotheses follows. The paper concludes with a lengthy discussion of the theories of aurora which begins with the statement that the evidence favors the corpuscular rather than the light theories. He reviews the corpuscular theories of one sign (BIRKELAND-STÖRMER and STÖRMER's equatorial ring current), theories based on neutralized corpuscular streams (ALFVÉN and MARTYN) and magnetic storm (as developed by CHAPMAN and FERRARO after MARTYN) and considers the last the most promising. A bibliography (without titles) of about 75 items is included. *Subject Headings:* **1. Auroras 2. Auroral theories 3. Auroral spectra.**—*M.L.R.*

4J–231 551.501.89:551.594.51

Forsyth, P. A. (*Physics Dept. Univ. of Saskatchewan, Saskatoon, Canada*), **Radio measurements and auroral electron densities.** *Journal of Geophysical Research*, 58(1):53–66, March **1953.** 3 figs., table, 13 refs., 15 eqs. **DWB**—Radar echoes from aurora have been recorded simultaneously at frequencies of 56 and 106.5 Mc/sec. The ratio of the echo amplitudes at the two frequencies varies between wide limits. An attempt is made to reconcile the experimental evidence with (*i*) partial reflections from the surfaces of large ionized regions in the aurora, (*ii*) scattering from inhomogeneities in the auroral ionization, and (*iii*) critical reflections from small volumes of intense ionization. It is concluded that (*iii*) is responsible for the typical auroral echoes which are observed at Saskatoon, although (*ii*) may be responsible for echoes of small amplitude which are often observed in the early stages of an auroral display. If these conclusions are correct, the occasional existence is indicated of electron densities of 10^8 per cm^3 in small volumes of the aurora. *Subject Headings:* **1. Radar echoes from auroras 2. Auroral physics.**—*Author's abstract.*

4J–232 551.501.89:551.510.535.550.385

Harang, Leiv, and Landmark, B., **Radio echoes observed during aurorae and terrestrial magnetic storms using 35 and 74 Mc/s waves simultaneously.** *Nature*, London, 171(4362):1017–1018, June 6, **1953.** fig., 6 refs. **DLC**—Records at Tromsø and Kjeller during auroras and geomagnetic storms are reproduced. At Tromsø (near auroral zone) echoes appeared regularly on 35 Mc/s and often on 74 Mc/s, attributed to reflection by land and sea of backward scatter from E_s layer. Other characteristics of the echoes are discussed and explained in the same way. *Subject Headings:* **1. Radio echoes from auroras 2. E layer 3. Magnetic storms.**—*C.E.P.B.*

4J–233 535.243:551.594.51

Hunten, D. M., **A rapid-scanning auroral spectrometer.** Saskatchewan. University. Physics Dept., Contract AF 19(122)-152, Scientific Report, No. AR-10, [1953?] 9 p. 7 figs., eqs. **DWB.** Also in: *Canadian Journal of Physics*, 31(5):681–690, July **1953.** 7 figs., 5 refs., eqs. **DWB**—A spectrometer is described which is capable of obtaining an auroral spectrum in ten seconds with 10A resolution. It uses a 4 by 4 inch, 6000 lines/cm. grating and parabolic mirrors for focusing. The detector is a 1P21 photomultiplier cooled by dry ice, and the spectrum is recorded by a high-speed magnetic oscillograph. The amplifiers are described and a few sample spectra shown. Some relevant optical equations are collected in appendix. *Subject Headings:* **1. Spectrometers 2. Auroral spectrometers. I. Saskatchewan. Univ. Physics Dept. II. Contract AF 19(122)-152.**—*Author's abstract.*

4J–234 551.594.52(266)

Jacka, F., **The southern auroral zone as defined by the position of homogeneous arcs.** *Australian Journal of Physics*, 6(2):219–228, June **1953.** 8 figs., 17 refs., 5 eqs. **DWB**—Previous studies on frequency distribution of geographic position of auroras were based on the data taken from various periods in the sunspot cycle and the observations referred to auroras of all forms. The present study is based on observation of one type of aurora—the homogeneous arc (HA)—and the latitude of the southern auroral zone as defined by the most frequent position of HA observed at Macquarie Island during the period May 1950–April 1951. "The latitude of HA is found to be significantly dependent on the geomagnetic planetary disturbance index K_p and the time of day. For given values of K_p and time the probability distribution of latitude of HA has a sharply defined mode about 0.5° north of the mean." *Subject Headings:* **1. Auroral frequencies 2. Aurora australis 3. Macquarie Island, South Pacific.**—*M.L.R.*

4J–235 550.3(05)

Journal of Geophysical Research. Dr. Merle A. Tuve (*ed.*). Published by Johns Hopkins Press, Baltimore 18, Md. First issue received v. 54, No. 1, March **1949;** latest issue, v. 58, No. 1, March **1953.** Price: $3.50 per year. **DLC, DWB**—This publication, which is a continuation of *Terrestrial Magnetism and Atmospheric Electricity* (1896–1948), has for over half a century been the world's outstanding journal devoted principally to the field of terrestrial magnetism and the aurora. The classified bibliographies contain many references to auroras, and logs of auroras and magnetic data from various parts of the earth are included in each issue. (*Same item as* 1–11, Jan. 1950, *MAB.*) *Subject Headings:* **1. Terrestrial magnetism 2. Auroras 3. Periodicals.**—*M.R.*

4J–236 551.5(05)

The Marine Observer; a Quarterly Journal of Maritime Meteorology prepared by the Marine Branch of the Meteorological Office. Published for the Meteorological Office. London, H.M. Stationery Office. v. 1–v. 23, Jan. 1924–July **1953.** 340 p. per vol. Price: £ 1 per yr. fig., tables. charts, plates. M.O. 566. **DLC, DWB**—This publication is a continuation of articles printed on backs of "Monthly Pilot and Meteorological Charts" (1901–1923) for the benefit of naval and merchant seamen interested in cooperating with the meteorological service. Material comprises illustrated popular but original articles and short contributions on marine meteorology and oceanography. Reports of observations of auroras at sea are a regular feature. (*Same item as* 1–14, Jan. 1950, *MAB.*) *Subject Headings:* **1. Marine meteorology 2. Auroras 3. Periodicals.**—*M.R.*

4J–237 551.594.5

Meinel, A. B. and Schulte, D. H., **A note on auroral motions.** *Astrophysical Journal*, Chicago, 117(3):454–455, May **1953.** 2 figs. **DLC**—Photographic sequence records of auroras taken at Yerkes Observatory show that while the general drift of auroral features is actually westward in the evening, it reverses and is eastward in the morning. This disproves the belief that the drift was westward only and rules out the old interpretation that the drift resulted from the earth's turning under an excitation source more or less fixed with respect to the earth-sun axis. *Subject Heading:* **1. Auroral drift.**—*M.L.R.*

4J–238 551.593:551.510.53(08) 551.594.5

Optical study of the atmosphere of the earth. *Optical Society of America, Journal*, 43(1):67, Jan. **1953. DWB**—A translation of the introduction by P. SWINGS to a volume containing the papers presented at the symposium on the Optical Study of the Atmosphere, held at the University of Liege, Belgium, on Sept. 3 and **4, 1951.** The papers were written by authorities in various fields of the subject. They cover: determination of the height of night-airglow-emitting layers; twilight phenomena; infrared absorption; auroras; turbulence of the upper atmosphere; and laboratory investigations. Discussions are included in the volume. Information regarding its purchase can be obtained from Mme. D. SENGIER, Institut d'Astrophysique, Cointe-Sclessin (Belgium). *Subject Headings:* **1. Auroras 2. Optical phenomena 3. Upper atmosphere research 4. Symposia.**—*G.T.*

4J–239 551.594.5

Paton, James, **Aurora borealis.** *Marine Observer*, 23(161):159–164, July **1953.** 5 figs. **MH-BH**—A popular account including isolines of frequency, relation to geomagnetism and to the sun, auroral forms, spectrum, etc. An appeal is made for observers for an aurora survey. *Subject Heading:* **1. Auroras.**—*C.E.P.B.*

SUPPLEMENTARY MATERIAL

4J–240 551.594.5(431/5

Leutmannen, Johann George, **Schediasma de aurora boreali; oder, Beschreibung des Nord Scheines welcher in the Nacht zwischen den 28 Februarii und Martii 1721 ist gesehen worden d dessen natürliche Ursachen angezeiget und erkläret werden.** [Treatise on the aurora borealis; o Description of aurora borealis which was seen in the night between Feb. 28 and March, 1721, wit its natural causes shown and explained.] Wittenberg, Gottfried Zimmermann, **1721.** 16 p. **DW** —In addition to a description of this great aurora that was observed in many parts of Europe, th author attempts an explanation of the phenomenon. He attributes the aurora to a "volatile salt which emanates from the earth and is similar to the salt which makes snow or cold weather. Or dinarily this volatile salt is invisible, but when winds blow in the colder regions the salt starts t vibrate and can be seen as an aurora, and when strong winds occur in the high atmosphere the impart to the salt a violent and tremulous motion which can be observed as a great aurora. I spring the aurora is usually followed by a warm spell of weather. Sometimes the aurora ends in lightning storm and sometimes it can be heard. These phenomena are still unexplained. Th author ends the treatise by admonishing the readers to stop fearing the aurora, which is not a super natural phenomenon but is explainable with present day knowledge. *Subject Headings:* **1. Aurora of March 1, 1721 2. Auroral theories 3. Germany.**—*M.R.*

4J–241 551.594.

Hellmann, Gustav, **Die älteste gedruckte Nordlichtbeschreibung.** [Oldest printed aurora description.] *Hellmann's Beiträge zur Geschichte der Meteorologie*, No. 3:107–113, **1914.** refs Also: **Die Entwicklung unserer Kenntnisse vom Nordlicht.** [Development of our knowledge of th aurora.] *Ibid.*, No. 13:47–58, **1922.**—HELLMANN has reproduced and carefully annotated th description by PETER CREUTZER, an astrologist, of the aurora of Oct. 11, 1527, which appeared on illustrated title pages to works by other authors. This aurora was called "Peter Creutzer's Comet," though the description of the red colors, rays, etc. leaves little doubt that it was an aurora. It wa observed in Westrich, part of Rheinpfalz. The same "terrible celestial vision" was seen that year i or near Lyon, France. The next certain aurora was on Jan. 30, 1560, and was observed by th Pastor JOHANN MERKEL at Reichebach in Saxony, and on Dec. 28, 1561, a display that was de scribed on 6 different German "Flugschriften" (fliers). The word "Nordlicht" comes from th Greenlandic "nordurljós" (1768) and was first used in Germany to describe the March 17, 171 display. CHR. KIRCH called it "Nordschein." In HELLMANN'S article on the development of ou knowledge of the aurora (No. 13) he gives citations from numerous rare sources—many in his own library, and from other published works of his. He gives the quotation from GASSENDI'S (1649) work where this remarkable philosopher-scientist-epicurean first uses the term "Aurora Borea" i published literature. He assumes that the term was in common usage at the time. The firs treatise summarizing knowledge of the aurora was a dissertation by H. VALLERIUS (Harald Valleri) of Uppsala, published June 11, 1708 (32 p., figs.). He allows for an aurora australis, theorizes that ice crystals below the horizon reflect the sunlight (as did academician F. CHR. MAIER in St Petersburg, independently, in 1728). The March 1716 auroras were described widely in Germa literature, and many quotations are given. The knowledge of the aurora which began in Germany during 1560–1590 and remained until 1707 and 1716–1721 was also augmented in England and France in 1716, in Italy in 1723–1727, in Sweden in 1708 and Russia in 1726. *Subject Headings:* **1. History of auroral research 2. Terminology 3. Aurora of March 17, 1716 4. Germany.**—*M.R.*

4J–242 551.5(09)

Britton, C. E., **A meteorological chronology to A.D. 1450.** *Great Britain. Meteorological Office, Geophysical Memoirs*, 8(70), **1937.** 177 p. bibliog. p. 164–176. **DLC**—Chronologies, histories, chronicles and general works were used as sources. The 29 chronologies are chiefly in English, including such works as SHORT'S "A general chronological history of the air, weather, seasons, meteors, etc." (1749) and LOWE'S "Natural Phenomena; and Chronology of the seasons" (1870). Six foreign works are included. Approximately 230 histories, chronicles and general works were also examined. The bulk of these, in English and Latin, includes: "Anglo-Saxon Chronicle" (1861); BEDE'S "Historia Ecclesiastica Gentis Anglorum" (Eng. trans., Bohn, 1907); CASE'S "Annals of Ireland" (1886); "Chronicles of Picts and Scots" (1867), numerous references to the observation of auroras (bottles in the air) are included, the earliest being in 112 A.D.; THOMSON'S "Introduction to meteorology" (1849); STOW'S "The annales or generall chronicle of England" (with HOWES additions) (1615). JULIUS CAESAR in his "De Bello Callico" provides the earliest authentic reference to weather in or around the British Isles. *Subject Headings:* **1. Chronology 2. Auroras.**—*M.L.R.*

4J–243 551.594.5

Egedal, J., **Observations of aurora from the Danish light-vessels during the years 1897–1937.** *Danske Meteorologiske Institut, Meddeleser*, **1937.** 7 p. 2 figs., 6 tables. **GB-MO**—Includes annual and monthly mean frequency of aurora at 12 light-vessels, and total number of nights with aurora observed at one or more (12.2, ranging from 0.0 in June to 2.1 in March and 2.0 in Oct.). Frequencies are also tabulated for years of 11 year sunspot cycle, showing approximate parallelism, and for 6 days before or after a spot passes meridian of Sun (maximum 0–2 days after passage). *Subject Headings:* **1. Auroral frequencies 2. Sunspot effects.**—*C.E.P.B.*

4J–244 550.38 551.594.5(02)

Nippoldt, Alfred, **Erdmagnetismus, Erdstrom und Polarlicht.** [Earth magnetism, earth current and aurora.] 4th ed. Berlin, Walter de Gruyter & Co., **1937.** 128 p. 13 figs., 9 tables, refs., 21 eqs. **DWB**—A pocket size textbook devoted mainly to terrestrial magnetism, the solar magnetic field, variations in geomagnetism, earth currents and lastly the aurora. Chapters 27 to 36 cover the history, forms, geographical distribution, height, periodicity, physics, laboratory experiments, theories, relation between auroras and geomagnetism, and relation to weather. The author believes that the aurora does not affect geomagnetism, but on the contrary is affected by the earth's magnetic field and disturbances thereof. Also he believes that cirrus clouds may be caused by auroras but no other weather phenomenon is thus influenced. *Subject Headings:* **1. Auroras 2. Geomagnetism 3. Auroral theories 4. Textbooks.**—*M.R.*

4J–245 551.521.4:551.594.5

†Khvostikov, I. A., **Svechenie nochnogo neba.** [Light of the night sky.] 2nd rev. ed. Moscow, Akademiia Nauk, **1948.** 495 p. plates, diagrs., 434 refs., eqs. **DLC**—Chap. I of this excellent summary of theoretical and experimental knowledge of the aurora and night airglow, takes up the several aspects of the aurora which are included in this bibliography: (a) form, (b) geographic and (c) height distribution, (d) rays, sunlit auroras, (e) spectra, (f) hydrogen lines, luminescent clouds, (g) aurora, magnetic storms and ionosphere with respect to solar activity, (h) origin of aurora, and (i) laboratory experiments of Birkeland, Störmer and Boguslavskiĭ. The remaining ten chapters deal with the physics, chemistry and spectra of the aurora and airglow. The most extensive bibliography covers sources from every part of the world. Of the 434 references, 50 are from Russian sources in the Russian language. (*Same item as* 2.10–99, Oct. 1951, *MAB.*) *Subject Headings:* **1. Auroras 2. Light of the night sky 3. Auroral physics 4. Auroral bibliographies 5. Textbooks.**—*M.R.*

4J–246 551.508.99

Alaska. University. Geophysical Institute, **Experimental investigations of the upper atmosphere during periods of auroral activity.** Contract AF 19(122)-431, Progress Reports No. 1 and 2, Nov. 1, 1950 to Aug. 1, 1951. 15 p. **DWB**—A description of the instrumentation employed in the investigation of auroral display, namely: infrared and ultraviolet spectrographs, apparatus and discharge tubes for studies of afterglow. Various projects undertaken are tested and described and some of the results are discussed. *Subject Headings:* **1. Auroral instruments 2. Upper atmosphere. I. Contract AF 19(122)-431 II. Herman, Louis.**—*I.L.D.*

4J–247 551.594.5:

Chapman, Sydney (*Queen's College, Oxford, Eng.*), **Notes on auroral geometry and optics: I—to locate an elevated point viewed from two ground stations in the same diametral plane.** *Journal of Geophysical Research*, Wash., D. C., 58(3):347–352, Sept. **1953.** 5 figs., 2 tables, 2 eqs. **DWB**—A simple graphical method is explained for obtaining the height and location of a point P from its elevations e and e' as observed from two points Q, Q' on the earth's surface, in the same diametral plane as P. *Subject Headings:* **1. Auroral height determination 2. Triangulation.**—*Author's abstract.*

4J–248 551.594.5:550.38(71)

Jensen, R. E. and Currie, B. W., **Orientations of auroral displays in west-central Canada.** *Journal of Geophysical Research*, 58(2):201–208, June **1953.** 3 figs., 5 refs. **MH-BH**—Orientations of auroral arcs relative to the geomagnetic meridians of the centered dipole have been determined from 628 single-stations photographs taken during 1949, 1950, and 1951 at Saskatoon, Canada. A statistical analysis of the orientations brings out the reality of a seasonal variation in their direction. After this seasonal variation is taken into account, latitudinal and longitudinal variations of direction disappear and the existence of a diurnal variation of direction becomes at least doubtful. The angle (measured from south around by west) between the westward extension of an auroral arc and the geomagnetic meridian is at minimum during October and November, and again during April and May. *Subject Headings:* **1. Auroral orientation 2. Geomagnetism 3. Saskatoon, Canada.**—*Author's abstract.*

PART III. METEOROLOGICAL ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS

Note: The contents of periodicals included in this section, are for information only, and will not be listed in the monthly indexes. When material is furnished in advance of date of publication, the pagination may be omitted.

American. Geophysical Union, Transactions, Volume 34, Number 4, August 1953.

McDonald, James E.: **On the electrical conductivity of the lower stratosphere,** p. 529–533.

Blanchard, Duncan C.: **A simple recording technique for determining raindrop size and tim of occurrence of rain showers,** p. 534–538.

Worthington, L. V.: **Oceanographic results of project skijump I and skijump II in the polar sea 1951–1952,** p. 543–551.

Troxell, Harold C.: **The influence of ground-water storage on the runoff in the San Bernardin and Eastern San Gabriel Mountains of Southern California,** p. 552–562.

Croft, A. R. and Monninger, L. V.: **Evapotranspiration and other water losses on some aspe forest types in relation to water available for stream flow,** p. 563–574.

Banks, Harvey O. and Richter, Raymond C.: **Sea-water intrusion into ground-water basin bordering the California Coast and inland bays,** p. 575–582.

Smallshaw, James: **Some precipitation-altitude studies of the Tennessee Valley authorit and discussion,** p. 583–588.

Collis-George, N.: **Calculation of the permeability of porous media from their moisture char acteristics,** p. 589–593.

Hopkins, Charles D., Jr.: **The celerity of very large flood waves in the Arkansas Basin,** p. 594 596.

American Meteorological Society, Bulletin, Volume 34, Number 6, June 1953.

Fawbush, Ernest J. and Miller, Robert C.: **A method for forecasting hailstone size at the earth' surface,** p. 235.

Williams, Thomas L.: **The use of insolation in forecasting temperatures,** p. 245.

Showalter, A. K.: **A stability index for thunderstorm forecasting,** p. 250.

Tannehill, I. R.: **First session of the commission for synoptic meteorology** (CSM), April 1953 p. 253.

Sherman, Leon: **A proposed modification of hurricane reconnaissance procedures,** p. 256.

Abstracts of papers to be presented at Toronto Meteorological Conference, September 9–15 1953, p. 264.

Presentation of AMS award for distinguished service to meteorology to Harry F. Guggenheim April 30, 1953, p. 273.

Annali di Geofisica, Rome, Volume 6, Number 1, January 1953.

Mariani, F.: **Densità elettronica nell'alta atmosfera e interpretazione delle curve h′ (f) dell'al tezza virtuale della ionosfera,** [Electronic density in the upper atmosphere and the inter pretation of the curve h′ (f) of the virtual height of the ionosphere], p. 21–45.

Godoli, G.: **Le piogge della Libia e l'attivita' solare,** [Rainfall and solar activity of Libya] p. 124–136.

Australian Journal of Physics, Volume 6, Number 2, June 1953.

Christiansen, W. N. and Warburton, J. A.: **The distribution of radio brightness over th solar disk at a wavelength of 21 centimetres,** p. 190–202.

Deacon, E. L.: **Climatic change in Australia since 1880,** p. 209–218.

Jacka, F.: **The southern auroral zone as defined by the position of homogeneous arcs,** p. 219–228

Day, G. A.: **Radar observations of rain at Sydney, New South Wales,** p. 229–239.

Geofisica Pura e Applicata, [Milan], Volume 25, 1953.

Marussi, Antonio: **Sulla divergenza del campo gravimetrico normale,** [The divergence of the normal gravimetric field], p. 1–5.

Castoldi, Luigi: **Elasticità e plasticità nella contrazione di volume di un solido isotropo sottoposto a pressione idrostatica,** [Elasticity and plasticity in the contraction of volume of an isotropic solid subjected to hydrostatic pressure], p. 6–12.

Das Gupta, Sushil Chandra: **Propagation of Rayleigh waves in soils,** p. 13–16.

Tomaschek, R.: **Non-elastic tilt of the earth's crust due to meteorological pressure distributions,** p. 17–25.

Egedal, J.: **On the magnetic *H*-balance for the Galathea deep-sea expedition,** p. 26–28.

Belluigi, Arnaldo: **Lineamenti teorici di nuovi metodi di carotaggio fisico: matranslog & phaselog,** [Theoretical outline of a new method of physical prospecting: Matranslog and Phaselog], p. 29–36.

Werner, P. Wilh.: **On non-artesian groundwater flow,** p. 37–43.

Pollak, L. W. and Murphy, T.: **Comparison of photo-electric nuclei counters,** p. 44–60.

Mühleisen, R. and Holl, W.: **Elektrische Aufladung fallender Wassertropfen,** [Electrical charges on falling drops], p. 61–70.

Broc, M. Jean, Vassy, Arlette and Vassy, Etienne: **Échos anormaux observés avec le radar du Musée Océanographique de Monaco,** [Abnormal echoes observed by radar at the Oceanographic Institute of Monaco], p. 70–82.

Huss, Eduard: **Ein neuer Windschreiber für kleine Windgeschwindigkeiten,** [A new wind recorder for light winds], p. 83–91.

Berg, Hellmut: **Zur Blockierung der Westwinddrift,** [Blocking action in the westerlies], p. 92–100.

James, R. W.: **On the propagation of pressure-patterns: Part I & II,** p. 101–122.

Polli, Silvio: **Il graduale aumento del livello del mare lungo le coste Italiane,** [Gradual rise in the sea level along the Italian Coast], p. 123–129.

Polli, Silvio: **Attività solare e frequenza dei temporali,** [Solar activity and thunderstorm frequency], p. 130–134.

Bouët, Max: **La fréquence des orages dans les Alpes de la Suisse Occidentale,** [Frequency of thunderstorms in the Alps of western Switzerland], p. 135–140.

Gião, Antonio and Raymond, F. H.: **Un calculateur électronique analogique pour la prévision mathématique du temps,** [An electronic analog calculator for mathematical weather forecasting], p. 141–202.

Karapiperis, Photios P.: **Characteristics of local winds at Athens, Greece,** p. 202–206.

Fritsch, Volker: **Die geoelektrische Überprüfung der Baugrundverfestigung durch Zementinjektionen,** [Geoelectric verification of solidification by means of injection of cement], p. 207–213.

Bossolasco, Mario and Meda, Fernando: **Perfezionamenti nelle misure di elettricità atmosferica,** [Improvements in the measurement of atmospheric electricity], p. 214–220.

Braham, R. R., Jr.: **The energy of thunderstorm electrical activity,** p. 221–222.

Israël, H.: **World symposium on spherics,** p. 223–224.

Időjárás, [Budapest], Volume 57, Number 1, January/February 1953.

Aujeszky, László: **Egy általános tetel felállítása a sztatikus egyensulyban lévö légoszlop állapothatározóiról,** [Establishment of a general relation for air-mass properties of a column of air in static equilibrium], p. 1–8.

Otta, Endréné: **A zuzmara förejelzése,** [Rime forecasting], p. 8–19.

Horváth, Ferenc: **Erdösávok hatása a mezögazdasagi kultúrákra,** [Effects of forest shelter belts on farm crops], p. 20–25.

Péczely, György: **A csapadék hullámzása eurôpában,** [Precipitation fluctuation in Europe], p. 26–31.

Grabovszkij, R. I.: **A légkör kicsapódási magjainak származásáról,** [Origin of atmospheric condensation nuclei], p. 32–34.

Körösi, György: **Idöjárási tényezök szerepe a repülést irányíto rádio-szolgálatban,** [Role of weather factors in the aviation broadcasting service], p. 35–40.

Téli, Sándor: **A meteorológia 5 éves tervünk szolgálátaban,** [Meteorology in the service of our 5-year plan], p. 49–50.

Kallós, Imréné: **A folyók befagyása és az idöjárás,** [Freezing of rivers and the weather], p. 50–51.

Kolobkov, N. V.: **As 1953. január 31–1 angliai vihar,** [The storm of Jan. 31, 1953 over England], p. 52–54.

Népi idöjóslási adatok a tiszánrúlról, [Weather maxims of East Hungary], p. 60–63.

Bartha, Lajos: **A föld gázesövája,** [The earth's gaseous train], p. 64.

International Symposium on Atmospheric Turbulence in the Boundary Layer, Massachuset Institute of Technology, June 4–8, 1951. [Proceedings], ed. by E. W. Hewson [an others]. **U. S. Air Force. Cambridge Research Center, Geophysical Researc Papers,** No. 19, December 1952.

Sutton, O. G.: **Some unsolved problems in the physics of the earth's boundary layer,** p. 25–3
Priestley, C. H. B.: **Atmospheric turbulence in the boundary layer. An appraisal of the preser position,** p. 33–48.
Lettau, H.: **The present position of selected turbulence problems in the atmospheric boundar layer,** p. 49–95.
Halstead, M. H.: **The relationship between wind structure and turbulence near the ground** p. 97–129.
Montgomery, R. B.: **The present position of the study of exchange across the ocean-atmospheri interface,** p. 131–141.
Munk, W. H.: **The roughness of the air-sea boundary,** p. 141–144.
Stommel, H.: **Streaks of natural water surfaces,** p. 145–154.
Sheppard, P. A.: **Current research at Imperial College, London, on the structure of turbuler flow,** p. 155–164.
Hewson, E. W.: **A method for determining the parameters of turbulent flow through the whol vertical extent of the boundary layer,** p. 165–170.
Gill, G. C.: **Micrometeorological instrumentation at MIT's round hill field station,** p. 171–185
Cramer, H. E.: **Preliminary results of a program for measuring the structure of turbulent flo near the ground,** p. 187–205.
Martinot-Lagarde, A.; Fauquet, A. and Frenkiel, F. N.: **The IMFL anemoclinometer—a instrument for the investigation of atmospheric turbulence,** p. 207–230.
Taylor, R. J.: **Locally isotropic turbulence in the lower layers of the atmosphere,** p. 231–240.
Edinger, J. G.: **A technique for measuring the detailed structure of the atmospheric flow,** p 241–262.
McDonald, J. E.: **Measurement, analysis and interpretation of turbulent temperature fluctua tions,** p. 262–282.
Kassander, A. R., Jr. and Stewart, R. M., Jr.: **Recording and automatic tabulation of continu ously varying statistical data,** p. 283–292.
Miller, J. E.: **A photographic technique for analyzing turbulent motions of air,** p. 293–304.
Bunker, A. F.: **Turbulence research at W.H.O.I.,** p. 305–308.
Bunker, A. F.: **Recognition of the presence of convective currents within a non-saturate turbulent layer of the atmosphere,** p. 309–322.
Frankenberger, E. F. H.: **Investigations of the vertical exchange within the lowest decameter at Quickborn,** p. 323–344.
Sheppard, P. A.: **Current research at Imperial College, London, on the effects of turbulen flow-eddy fluxes,** p. 345–354.
Swinbank, W. C.: **The measurement of the vertical transfer of heat, water vapor and momentur by eddies in the lower atmosphere with some results,** p. 355–368.
Parson, D., Jr. and Bunker, A. F.: **A recording computer for the direct measurement of th turbulent heat exchange in the atmosphere,** p. 369–380.
Poppendiek, H. F. and Vehrencamp, J. E.: **Remarks on atmospheric turbulence research at th University of California, Los Angeles,** p. 381–196.
Inoue, E.: **On the Lagrangian correlation coefficient for turbulent diffusion and its applicatio to atmospheric diffusion phenomena,** p. 397–414.

Journal of Meteorological Research, Tokyo.

Volume 4, Number 2, May 1952.

Izawa, T.: **On damping waves in the westerlies,** p. 51–57.
Uwai, K.: **Tropopause wave and typhoon (1). (Analysis of typhoons in 1950 (II)),** p. 58–71
Nagao, T.: **Weather group and its application (2),** p. 72–75.
Shimizu, I.: **Influence of ventilation velocity of psychrometer upon humidity,** p. 76–81.
Fujimura, I.: **Diurnal variation of air pressure,** p. 82–95.

Number 6, September 1952.

Ito, H.: **Investigation of snow accretion on telegraph wires,** p. 251–268.
Takenouchi, Y.: **On the submarine daylight and the allied phenomena,** p. 268–324.
Nagao, T.: **Interdiurnal variability of temperature in Japan and her neighbourhood,** p. 325–33
Nishiyama, H.: **On the leakage error of the Dines' pressure tube anemometer,** p. 332–336.
Arakawa, H.: **Meteorological observations made in Osaka for the period 1828–1833,** p. 337–34

Journal of Meteorological Research, Tokyo.

Number 7, October 1952.

Otsuka, R.: **A study on the extended forecasting—(Based on the analysis of Northern Hemisphere Chart),** p. 343–347.
Akedo, K.: **Utilization of 5-day mean surface pressure at 40°N and 50°N for one week forecasting (in winter),** p. 348–350.
Oono, E.: **On the period of abnormal monthly mean air temperature at Miyako,** p. 351.
Sagara, M.: **On the periodicity of temperature during the warm season in Tôhoku District,** p. 352–358.
Tsuchiya, S.: **On the periodogram analysis of the amount of precipitation in Tôhoku District,** p. 359–362.
Fukuda, K.: **On the periodicity of frequency of air masses,** p. 363–366.
Endo, Y.: **On the period of 95 days,** p. 367–368.
Takasaki, K.: **Periodicity of air temperature,** p. 369–372.
Nagamitsu, E.: **Periodicity of the appearance of typhoon,** p. 373–374.
Takahashi, K. and collaborators: **Periodicities in the meteorological phenomena,** p. 375–394.
Ochi, K.: **On the long range forecasting of drought in summer and winter by making use of development and decay of monsoon,** p. 395–401.
Fuke, M.: **A method of long-range forecasting from spring to summer,** p. 402–404.
Fukuda, K.: **On the climate forecasting of summer,** p. 405–407.
Sakai, H.: **On the long-range forecast of snow coverage,** p. 408–410.
Yanagiya, K.: **On the analysis of frontal zone and its application for long-range forecast,** p. 411–415.
Sugawa, T. and Kumagai, I.: **On the relation between variation of latitude and the air temperature at Mizusawa,** p. 416–419.
Hiyama, K.: **On the seasonal forecast of "Baiu" or rainy season in Japan (1),** p. 420–423.
Ninomiya, S.: **Application of the ice-drift over the Okhotsk Sea to seasonal forecasting,** p. 424–425.
Matsukara, H.: **Discontinuous progress of climate and its forecasting by making use of aerological data,** p. 426–436.
Seki, K.: **On the locality in long-range forecasting,** p. 437–443.
Ogawara, M.: **Methodology of long-range forecasting,** p. 102–117.

Number 8, November 1952.

Ogawara, M.; Ozawa, T.; Suzuki, E.; Fujita, T. and Tomatsu, K.: **Climatic change in Japan and climatological statistics,** p. 461–524.
Oosawa, K.: **On the Baur's ten-day weather forecasting method applied in Japan,** p. 525–562.
Watanabe, T.: **On the trajectory of air particle accompanying a moving cyclone and anticyclone in a linear pressure field,** p. 563–568.
Ishikawa, G.; Kitamura, M. and Katena, M.: **On the magnetic disturbance caused by the electrical leakage current into the earth,** p. 569–580.
Watanabe, T.: **A dynamical method for obtaining the air particle which arrives at a fixed point after a definite time interval,** p. 581–584.

Number 9, February 1953.

Akedo, K.: **Application of the mean pressure values at 40°N and 50°N to extended forecasting in winter,** p. 585–591.
Tanabe, S.: **Typhoon forecast by using the intensity change of Bonin high,** p. 593–594.
Mori, Y.: **Forecasting of weather tendency,** p. 595–599.
Saito, S.: **On flood forecasting of the river Yodo,** p. 601–611.
Uchida, Y.: **Forecast of river water level by using precipitations amount,** p. 613–615.
Matsuo, K.: **Water level at the downstream of the River Kumano and precipitation,** p. 617–620.
Kanaya, K.: **A statistical study of rainfall caused by typhoon in Kobe area,** p. 621–626.
Nishida, M.: **Objective weather forecasting in Hiroshima,** p. 627–630.
Imada, M. and Sudo, T.: **Heavy rainfall forecasting in Tokushima Prefecture,** p. 631–641.
Yoshizawa, Z.: **On the distribution of precipitation in Ehime,** p. 643–647.
The Kobe Marine Observatory and Others: **The co-operative observation of land and sea breeze in Hiuchi-Nada,** p. 649–658.
Suzuki, H.: **The gusts in the inland sea,** p. 659–661.
Ida, T.: **On the wind distribution in Hiroshima (1st report),** p. 663–668.
Fukuda, Y.: **On the seasonal change of wind distribution in Himeji,** p. 669–673.
Nakamura, H.: **Stream lines of wind in Kyoto city,** p. 675–683.

Furuichi, M. and Saito, T.: **On the computation of vertical velocity,** p. 685–693.
Saito, T.: **On the difference between eye-observation and pilot balloon measurement of cloud** p. 695–697.
Narikawa, J.: **Air currents at cirrus-level,** p. 699–703.
Kitamura, K.: **Meteorological conditions in the "Shōsōin" Treasure House, (A report o Shōsōin Observation),** p. 705–710.
Fukuda, H.: **On the relation between fire and weather in Himeji,** p. 711–714.
Katsui, T.: **Railway accident and weather,** p. 715–721.
Kimura, T. and Yoshioka, S.: **On railway accidents due to bad weather,** p. 723–727.
Yoshioka, S. and Kimura, T.: **Fires along railway,** p. 729–730.
Tanemura, I.: **On the telemeteorograph,** p. 731–732.
Watanabe, M.: **Earthquake in Wakayama and movement of the ground,** p. 733–736.
Yoshizawa, Z.: **Shipwreck in the Kurushima channel,** p. 737–740.

Journal of Meteorological Research, Tokyo.

Number 10, February 1953.

Utsumi, T.: **A method of seasonal forecast using the monthly pressure deviation observed a Mt. Iwate in Tōhoku District,** p. 741–744.
Sugawa, C.: **Abnormally long-lived sunspot groups and 25-day period in air temperature,** p 745–749.
Sakai, H.: **On the relation between path of travelling anticyclone in spring and air temperatur or rainfall amount in summer in Tōhoku District,** p. 751–755.
Morioka Weather Station: **Maximum possible precipitation in the upper Kitakami basin** p. 757–775.
Inawashiro and Fukushima weather stations: **On the snow survey around the Urabandai Lakes** p. 777–792.
Tajima, S., Sato, Y., Saito, J., Fujiwara, H. and Sekine, Y.: **On the very hot weather at Fuku shima in summer,** p. 793–802.
Sasaki, Y.: **On the humidity dip accompanied by thunderstorm,** p. 803–806.
Umeda, S.: **On the heavy rainfall in the middle part of Akita Prefecture on 6 August, 195** p. 807–815.
Sakai, H.: **On the correlation between sunshine duration and air temperature in winter i Tōhoku District,** p. 817–820.

Number 11, February 1953.

Ishihara, K. and Fukui, A.: **A study on snow melt flood forecasting,** p. 821–835.
Fukui, A.: **The snow survey in the drainage area of the Uono River in 1952,** p. 837–852.
Kunii, K.: **Meteorological elements controlling the decrease of snow coverage,** p. 853–855.
Oniki, N.: **A note on rainfall forecasting,** p. 857–862.
Isono, Y.: **Report of testing the precipitation gauge in which a calcium chloride solution wa contained,** p. 863–870.
Seki, K.: **On the remote recording instrument to forecast snow disaster,** p. 871–877.
Matsuhashi, S. and others: **On the "Pibal-Lamp" observation,** p. 879–895.
Sakata, K.: **7-day weather forecasting in rainy season by Isopleth chart,** p. 897–901.
Sakata, K.: **A new classification of season (part 2),** p. 903–911.
Nakayama, A.: **On the so-called secondary orographic frontal rainfall (Part 1),** p. 913–917.
Nakayama, A.: **On the so-called secondary orographic frontal rainfall (Part 2),** p. 919–923.
Nakashima, M.: **On the condensation trail,** p. 925–932.
Kitamura, H.: **The microbes in the standard sea water (1),** p. 933–935.
Sasaki, K.: **On the effective humidity,** p. 937–940.

Number 12, March 1953.

Nagayama, M.: **On the forecasting of the rate of development of cyclones generated in th southern part of East China Sea in winter,** p. 941–944.
Kajiwara, S. and Ureshino, Y.: **Forecasting of waves in the East China Sea,** p. 945–950.
Nagai, M.: **On the annual variation of sea water temperature and chlorinity at Gotonad** p. 951–958.
Yamaguchi, T.: **A synoptic study on the utilization of marine observational data to weathe forecasting,** p. 959–962.
Nakayama, A.: **On the cold front passing over the mountainous region in the central parts o Japan (2nd report). (On the strong wind near Fiji-machi),** p. 963–973.

Nakayama, A.: **On the so-called secondary orographic frontal rainfall (Part 3)**, p. 975–979.
Kato, H.: **Quantitative forecasting in Tokai District**, p. 981–984.
Ogusu, J.: **Change of weather elements associated with cold-front passage**, p. 985–992.
Susuki, K.: **On the locality of climate in Tokai District**, p. 993–998.
Kubota, K.: **A study of dynamic climatology**, p. 999–1002.
Yasui, H.: **The mechanism of the outbreak of cold wave and its forecasting**, p. 1003–1011.
Ishida, T.: **Vertical change of wind direction**, p. 1013–1015.
Sato, S.: **Heavy rainfall at Owashi**, p. 1017–1020.
Hiramitsu, H.: **On the change of air temperature at Gifu**, p. 1021–1024.
Nagao, S.: **The relation between the effective relative humidity and the amount of evaporation**, p. 1025–1028.
Imura, U. and Noda, H.: **Rainfall forecasting by pressure difference at Nagoya**, p. 1029–1033.
Kunii, K.: **The tree temperature of Yoshino-Zakura (a kind of cherry blossom)**, p. 1035–1038.
Ichikawa, Y.: **Prediction of minimum air temperature in April and May**, p. 1039–1041.

Journal of Meteorological Research, Tokyo.

Volume 5, Number 1, March 1953.

Uwai, K.: **Tropopause wave and typhoon (II)**, p. 1–18.
Suzuki, S.: **Differential barograph**, p. 19–30.
Kamamoto, H. and Kimura, S.: **On the nickel resistance thermometer for meteorological use**, p. 31–36.
Miyake, T.: **A note on the pressure tube anemometer**, p. 37–42.
Kawano, Y.: **Temperature-compensated float for Dines' pressure tube anemometer**, p. 43–46.
Kitaide, M. and Kawamoto, T.: **On the existence of subtropical frontal zone**, p. 47–56.
Nogami, K.: **Observation of the depth of frozen soil by electrical resistance method**, p. 57–62.
Sugawara, N.: **On the free oscillation of sea water at Kushiro harbour**, p. 63–66.
Watanabe, K.: **On the area of sea fog coverage over Yufutsu Plain**, p. 67–69.

Number 2, March 1953.

Seki, K.: **A method of extended forecasting**, p. 71–80.
Terasawa, H.: **Precipitation on the coast of Hokuriku District**, p. 81–84.
Fukuhara, K.: **On the snowfall forecasting**, p. 85–88.
Hata, S.: **On the cloud due to monsoon at Niigata**, p. 89–94.
Ito, K.: **A new type snow gauge (2nd report)**, p. 95–98.
Kunii, K.: **On the trial manufacture of some new snow gauges**, p. 99–102.
Ishikawa, S.: **On the temperature on south and north side of a shelter**, p. 103–110.
Yamanaka, T.: **On the experimental observation by snow-accretion proof anemometer (part 1)**, p. 111–112.

Number 3, March 1953.

Kitazawa, S. and Kobayashi, K.: **On the index of drought**, p. 119–124.
Isozaki, I.: **Strong southwest wind in the south of Kanto District**, p. 125–134.
Ota, Y. and Sawairi, S.: **Tornado on 2 November, 1951**, p. 135–142.
Ota, Y.: **On the sea wave at Omaezaki (Part 4), (Diffraction of sea wave)**, p. 143–146.
Fushiki Weather Station: **On the relation between cherry blossoming day and weather elements at Fushiki**, p. 147–158.
Ichikawa, T. and Shimakawa, K.: **The relation between rainfall amount and runoff**, p. 159–164.
Seshimo, Y.: **On the zonal wind in the winter, Nov. 1951–April 1952**, p. 165–172.
Onodera, A.: **On the precipitation accompanied with the cold front passing by Kushiro**, p. 173–178.
Kamiko, T.: **The warm high over Japan proper**, p. 179–184.
Ibaragi, T.: **A note on the forecast of fog occurrence**, p. 185–188.
Saito, T.: **A note on the zonal index**, p. 189–193.

Number 4, April 1953.

Takahashi, K. and collaborators: **Reviews of seasonal weather forecasting**, p. 195–204.
Watanabe, T.: **History of long-range forecasting studies**, p. 205–230.
Takahashi, K.: **Representation of the seasonal weather changes**, p. 231–264.
Kubota, S.: **Classification of seasons**, p. 265–296.
Okuta, M.: **Empirical rules on seasonal weather forecasting**, p. 297–328.

Journal of Meteorological Research, Tokyo.

Number 5, June 1953.

Research Division of Kobe Marine Observatory: **The results of the surface observations o board the R.M.S. "Syunpu-Maru" in Harima-Nada and the local meteorological observa tions in Shodo-Shima,** p. 329–342.

Kanaya, K. and Miyake, N.: **On the characteristics of extratropical cyclone in the light of th data of "Kiyokawa-Maru,"** p. 343–350.

Hirasawa, K.: **"Yakumizu" (Red tide),** p. 351–367.

Kimachi, T.: **On the seasonal change of upper troposphere,** p. 369–378.

Yasui, H. and Kato, H.: **On the mechanism and the forecasting of monsoon snowfall in Noob Plain,** p. 379–392.

Izawa, T.: **On the distribution of precipitation (1st paper),** p. 393–399.

Miyamoto, H.: **A note on the forecasting of weather transition by the pressure change,** (1 p. 401–421.

Yajima, Y.: **On the mechanism of tipping-bucket rain gauge,** p. 423–430.

Monthly Weather Review, Volume 81, Number 5, May 1953.

Longley, Richmond W.: **Variability of annual precipitation in Canada,** p. 131–134.

Winston, Jay S.: **The weather and circulation of May 1953—One of the worst tornado month on record,** p. 135–140.

Oliver, Vincent J. and Holzworth, George C.: **Some effects of the evaporation of widesprea precipitation on the production of fronts and on changes in frontal slopes and motions** p. 141–151.

Wexler, H.: **Readjustment of a front after cooling by precipitation,** p. 152–154.

Polarforschung, Kiel, Volume 3, Number 2, 1951.

Armstrong, Terence: **Beobachtungen auf dem nordsibirischen Schiffahrtsweg,** [Observation on the North Siberian sea route], p. 127–129.

Prigge, Hans: **Die antarktischen Landflächen im Lichte bewegungstechnischer Untersuchunger** [The Antarctic land surfaces in the light of continental drift], p. 132–135.

25 Jahre Archiv für Polarforschung, [25 years of polar investigation], p. 81–126.

Rivista di Meteorologia Aeronautica, [Rome], Volume 13, Number 1, January/March 1953.

Fea, Giorgio and collaborators: **Esperienze di provocazione artificiale della pioggia,** [Experi ments in the artificial production of rain], p. 3–15.

di Benedetto, Felice: **Il metodo di Scherhag per la costruzione della carta generale previst per 24 ore,** [Scherhag's method for constructing a 24-hour prognostic chart], p. 16–25.

Il tempo in Italia nel trimestre ottobre-Dicembre 1952, [The weather in Italy during October December 1952], p. 26–28.

Aldo, Cicala: **Un metodo simbolico di descrizione del tempo ad uso del publico,** [Symboli method of describing weather for the use of the public], p. 29–30.

La protezione antigrandine in Italia, [Hail protection in Italy], p. 52–53.

Le "raffiche in aria limpida," [Clear air gusts], p. 53–54.

Il polo del freddo, [The cold pole], p. 54.

Razzi per lo studio delle aurore boreali, [Rockets for the study of the aurora borealis], p. 55

Sapporo, Japan. Hokkaido University. Institute of Low Temperature Science, Studies o Fogs in Relation to Fog-Preventing Forest. Ed. by Takeo Hori, 1953.

Yoshida, Zyungo: **General survey of the studies on fog-preventing forest,** p. 1–23.

Kinoshita, Seiiti and Omoto, Yukio: **Statistics of fogs at Nemuro,** p. 25–33.

Imahori, Katsumi: **On the vanishing mechanism of advection fog and the role of turbulence** p. 35–67.

Yoshida, Zyungo: **A theoretical study on diurnal change of air and ground temperature on foggy day,** p. 69–80.

Fukutomi, Takaharu: **A theoretical study on the changes of liquid water contents of intrudin stationary sea fogs due to the capturing action of a forest in the coastal region,** p. 81–104

Yoshida, Zyungo: **A theoretical study on the distribution of fog density in a forest,** p. 105–112

Hori, Jun-ichi: **On the diffusion by turbulent motion near a forest and its effect upon the captur of fogs by the forest,** p. 113–135.

Ishida, Tamotsu and Hideo, Imai: **On the anemometers used in the field investigation of fogs** p. 137–144.

Ishida, Tamotsu, Kusunoki, Kou, Kobayashi, Teisaku and Imai, Hideo: **Measurement of atmospheric turbulence around a forest,** p. 145–168.
Tabata, Tadashi, Huzioka, Tosio and Matsumura, Nobuo: **On a recording fog meter,** p. 169–173.
Matsumura, Nobuo: **On the calibration of a fog meter,** p. 175–186.
Kuroiwa, Daisuke and Kinoshita, Seiiti: **A balloon fog meter and the vertical distribution of liquid water contents in lower atmosphere,** p. 187–204.
Huzioka, Tosio, Tabata, Tadashi and Matsumura, Nobuo: **The distribution of fog water contents in the surroundings of a forest,** p. 204–220.
Fukutomi, Takaharu and Sugawa, Akira: **A device of a portable fog meter of heat generating type by the use of sulphuric acid and rod- and string-shaped fog collectors,** p. 221–238.
Ŏura, Hirobumi: **On the capture of fog particles by a forest (I) and (II),** p. 239–259.
Yoshida, Zyungo and Kuroiwa, Daisuke: **Wind force on a conifer tree and the quantity of fog water thereby captured,** p. 261–278.
Kuroiwa, Daisuke: **The turbulent diffusion of fog water near the ground and the fog-preventing effect of an artificial model forest,** p. 279–302.
Kozima, Kenzi, Oono, Taketoshi and Yamaji, Kenji: **The size distribution of fog particles,** p. 393–309.
Kozima, Kenzi, Oono, Taketoshi and Yamaji, Kenji: **On the size distribution of fog particles in the vicinity of a fog-preventing forest,** p. 311–326.
Ooura, Hirobumi and Hori, Jun-ichi: **Optical method of measuring drop-size distribution of fog,** p. 327–333.
Kinoshita, Seiiti: **On the variations of fog density and wind velocity,** p. 335–342.
Kinoshita, Seiiti: **The number of fog particles produced by natural adiabatic expansion of air,** p. 343–347.
Kuroiwa, Daisuke: **Electron-microscope study of atmospheric condensation nuclei,** p. 349–382.
Hori, Jun-ichi: **Phenomenological approach to an aspect of the condensation mechanism of the atmospheric fog,** p. 383–399.

ndai, Japan. Central Meteorological Observatory, Bulletin of the Meteorological Society for Research of Tohoku District, Volume 6, Number 1, November 1951.

Tajima, S., Sato, Y., Takako, T., Fujita, T., Saito, J. and Fujiwara, J.: **On flood-forecasting in the upper and middle region of the River Abukuma,** p. 27–43.
Tajima, S. and Fujita, T.: **On the abnormal decrease of the ground water in Matsukawa Fan,** p. 44–49.
Iwasaki, T., Sasaki, K. and Kadowaki, T.: **On the flood forecasting in the downstream of the River Kitakami,** p. 50–53.
Sato, T.: **A statistical study of precipitation due to monsoon near Japan (1),** p. 54–62.
Ara, M.: **Late-frost damage in Miyagi Prefecture on 3rd May, 1951,** p. 63–66.
Kudo, T.: **Weather and clothing,** p. 67–74.

ion Kagaku (Low Temperature Science), Sapporo, Japan. Pub. by the Hokkaido Imperial University.

Volume 3, 1950.

Inouye, Naoichi: **Investigation on low temperature hygrometer,** p. 1–78.
Yosida, Zyungo: **Measurement of thermal conductivity of a mass of snow,** p. 79–87.
Yosida, Zyungo and Kuroiwa, Daisuke: **Sublimation in the interior of snow layer,** p. 89–100.
Yosida, Zyungo; Kozima, Kenzi and Aoki, Sin-iti: **Experiments on melting of snow layer,** p. 101–108.
Oura, Hirobumi: **Diffusion of light by fog,** p. 123–130.
Fukutomi, Takaharu; Kusunoki, Kou and Tabata, Tadesi: **Study of sea-ice, third to eighth reports,** p. 131–206.
Nakamura, Hiroshi; Kunori, Shoichi; Oka, Toshihiko and Soma, Saburo: **Researches on the low pressure endurance, Parts I–VI,** p. 339–361.

Volume 5, 1950.

Takano, Tamakichi: **Studies on ice formation with a windchannel, Pts. I–V,** p. 1–60.
Isida, Sigeo: **Study on the cracking of trees due to frost,** p. 61–73.
Yosida, Zyungo and Kozima, Kenzi: **Change in shape of snow crystals, I,** p. 78–83.
Yosida, Zyungo: **Heat transfer by water vapour in a snow cover,** p. 93–100.
Yosida, Zyungo and Kozima, Kenzi: **Thawing by black bodies buried in snow,** p. 101–107.

Volume 8, 1951.

Kuroiwa, Daisuke: **The dielectric behavior of snow cover,** p. 1–57.
Fukutomi, Takaharu and Kusunoki, Kou: **Study of sea ice, 15th report,** p. 59–88.

Weather, London, Volume 8, Number 8, August 1953.

Nagel, J. F.: **A new telemetering device for measuring instruments,** p. 227–231.
Balchin, W. G. V. and Pye, Norman: **The drought in the Southwestern United States,** p. 23
236.
Bonacina, L. C. W.: **British forest trees in the weather scene,** p. 237–242.
Roth, Gunter D.: **Photography of halo-phenomena,** p. 249.
Ludlam, F. H.: **Hill-wave cirrus in India,** p. 251.
Bond, H. G.: **Easterly jet-streams over Darwin,** p. 252–253.
Grinsted, W. A.: **Weather conditions in Trinidad and Barbados, 11 to 15 October 1952,** p. 25
254.
Laycock, P. A.: **A home-made rainfall recorder,** p. 256.

Weatherwise, Philadelphia, Volume 6, Number 4, August 1953.

Myers, Vance A. and Rubin, Lillian K.: **Fifty years of hurricanes,** p. 91–94.
Pardue, L. G.: **Weather amateur reporting network,** p. 95.
Jurwitz, Louis R.: **Arizona's two-season rainfall pattern,** p. 96–99.
Brooks, Edward M.: **Tornado tragedies of 1953,** p. 100–103.
Graham, Howard E.: **The Columbia Gorge wind funnel,** p. 104–107.
Ludlum, David M.: **The abnormalities of spring make big news,** p. 108–110.

World Meteorological Organization, WMO Bulletin, [Geneva], Volume 2, Number 3, Ju
1953.

Gordon, A. H.: **A renaissance of climatology?,** p. 62–66.
Ashford, O. M.: **Location of thunderstorms,** p. 67–70.
Weather forecasting—science or art?, p. 70–72.
Arid zone research, p. 77–78.
Technical assistance programme, p. 80–83.
Dreyer, A. J.: **South Africa introduces metric units,** p. 83–85.

LIST OF PERIODICALS

Note: This list contains the titles of the periodicals which regularly contain material on meteorology or related fields and it comprises only a small percentage of the periodicals from which pertinent articles are abstracted.

In this list the preferred form of title entry is given in bold face type. If the title is distinctive, the name and headquarters of the issuing society or organizations follows the title. If the title is not distinctive (for instance, Bulletin, Journal, Trudy, Mitteilungen), the entry consists of the issuing body followed by the title.

PERIODICALS IN WHICH METEOROLOGICAL ARTICLES REGULARLY APPEAR

Académie des Sciences, Paris, Comptes Rendus.
Akademiia Nauk, SSSR, Izvestiia, Ser. Geogr. and **Ser. Geofiz.**, [Moscow].
American Geophysical Union, Transactions, National Research Council, Washington.
★**American Meteorological Society, Bulletin,** [Boston].
★**Angewandte Meteorologie,** [Potsdam].
★**Annalen der Meteorologie,** Seewetteramt, Hamburg.
Annales de Géophysique, Centre National de la Recherche Scientifique, [Paris].
★**Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A** and **Ser. B,** [Vienna].
Australian Journal of Physics, [Melbourne].
Ciel et Terre, Société Belge d'Astronomie, de Météorologie et de Physique du Globe, [Brussels].
★**Geofisica e Meteorologia,** Società Italiana di Geofisica, [Genoa].
Geofisica Pura e Applicata, Istituto Geofisica Italiano, [Milan].
Geophysical Magazine, [Central Meteorological Observatory, Tokyo].
★**Időjárás,** Az Országos Meteorológiai és Földmágnességi Intézet [Budapest].
★**Indian Journal of Meteorology and Geophysics,** [Delhi].
★**Journal of Atmospheric and Terrestrial Physics,** [London].
Journal of Geophysical Research, [Washington].
★**Journal of Meteorological Research,** [Tokyo].
★**Journal of Meteorology,** American Meteorological Society, [Boston].
★**Journal Scientifique de la Météorologie,** Société Météorologique de France, [Paris].
★**The Marine Observer,** Air Ministry, Meteorological Office, London.
★**The Meteorological Magazine,** Air Ministry, Meteorological Office, London.
★**Meteorological Society of Japan, Journal,** Second Series, Kisho Shushi, [Tokyo].
★**La Météorologie,** Société Météorologique de France, [Paris].
★**Meteorologische Rundschau,** [Bad-Kissingen].
★**Meteoros,** [Buenos Aires].
★**Monthly Weather Review,** U. S. Weather Bureau, Washington, D. C.
Nature, [London].
★**Nimbus,** Sociedad Meteorológica de Bolivia, [La Paz].
Polarforschung, Archiv für Polarforschung in Kiel, [Kiel, Germany].
Revista de Geofísica, Instituto Nacional de Geofísica, [Madrid].
★**Revista Meteorologica,** Junta Nacional de Meteorología, Montevideo.
★**Rivista di Meteorologia Aeronautica,** Associazione Culturale Aeronautica, [Rome].
★**Royal Meteorological Society, Quarterly Journal,** [London].
Royal Society of London, Proceedings, Ser. B.
★**Tellus,** Svenska Geofysiska Föreningen, Stockholm.
Vsesoiuznoe Geograficheskoe Obshchestvo, SSSR, Izvestiia, [Moscow-Leningrad].
★**Weather,** Royal Meteorological Society, [London].
★**Weatherwise,** Amateur Weathermen of America, Philadelphia.
★**Wetter und Leben,** Österreichische Gesellschaft für Meteorologie, [Vienna].
★**WMO Bulletin,** World Meteorological Organization, [Geneva].
★**Zeitschrift für Meteorologie,** Meteorologisches Observatorium, Potsdam.

★ Indicates those periodicals which are primarily meteorological.

TABLE OF CONTENTS

Meteorological Abstracts and Bibliography. Volume 4, Number 10, October 1953

Foreword ....
Explanations ....

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

Works of Special Interest 1
General Meteorology 1
Meteorological Observations and Instruments 1
- Methods of Observation 1
- Observational Data 1
- Phenology 1
- Instrument Carriers 1
- Instruments 1

Synoptic Analysis and Forecasting 1
Cloud Seeding and Artificial Precipitation 1
Structure and Physics of the Atmosphere 1
- Structure of the Atmosphere 1
- Upper Atmosphere—Ionosphere 1
- Mechanics and Thermodynamics of the Atmosphere 1
- General Circulation 1
- Atmospheric Disturbances 1

Radiation and Temperature 1
- Radiation 1
- Air Temperature 1
- Soil Temperature 1
- Water Temperature 1

Pressure and Wind 1
- Pressure 1
- Winds 1
- Special Winds 1
- Wind Effects 1
- Upper Air Winds 1

Aqueous Vapor and Hydrometeors 1
- Humidity and Evaporation 1
- Condensation 1
- Fog 1
- Clouds 1
- Precipitation 1
- Hydrometeorology 1

Climatology and Bioclimatology 1
- Climatology 1
- Climate of Particular Places 1
- Climatic Changes 1
- Microclimatology 1
- Climatic Classification 1
- Bioclimatology 1
- Upper Air Climatology 1

Miscellaneous Applications 1
- Meteors 1
- Visibility 1
- Optical Phenomena 1
- Electrical Phenomena 1

PART II. SELECTIVE ANNOTATED BIBLIOGRAPHY ON AURORAS

Introductory Note 1
Outline of Contents 1
Bibliography on Aurora 1
Supplementary Material 1

PART III. METEOROLOGICAL ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS 1

PART IV. AUTHOR AND SUBJECT INDEXES

Index of Authors 1
Index of Subjects 1
Index of Geographical Locations 1

List of Periodicals .... Cove